Study and Application of systemic design to cooking system in vegetarian

LOHASTIME as an example

Giana.jiang Angela.zhang Qinyuan.zhang

Project Context

Background

Status
Scope
History&territory

Research

About Lohas
Research and measurement

Linear system

Quantitive and Qualitative analysis
Economic evaluation
Linear system

Systemic system

Solution
Systemic system
Relative product design

Part 1: Background and research of LOHAS

Gianna.jiang

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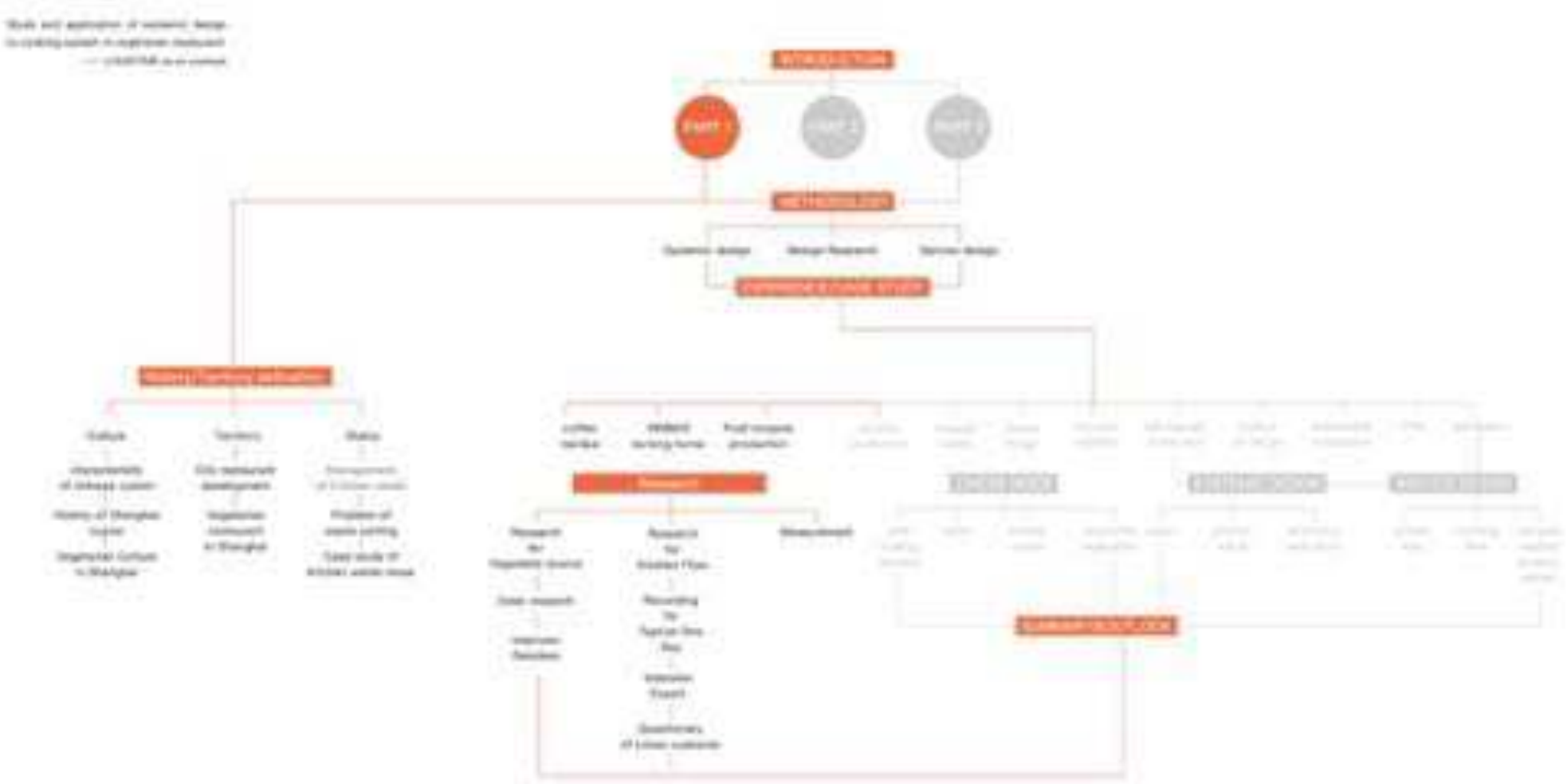
Gianna.jiang



Background

Resources? Garbage?

What is city food waste?

Urban kitchen waste?

What cause the problem?

How to solve

Background/status

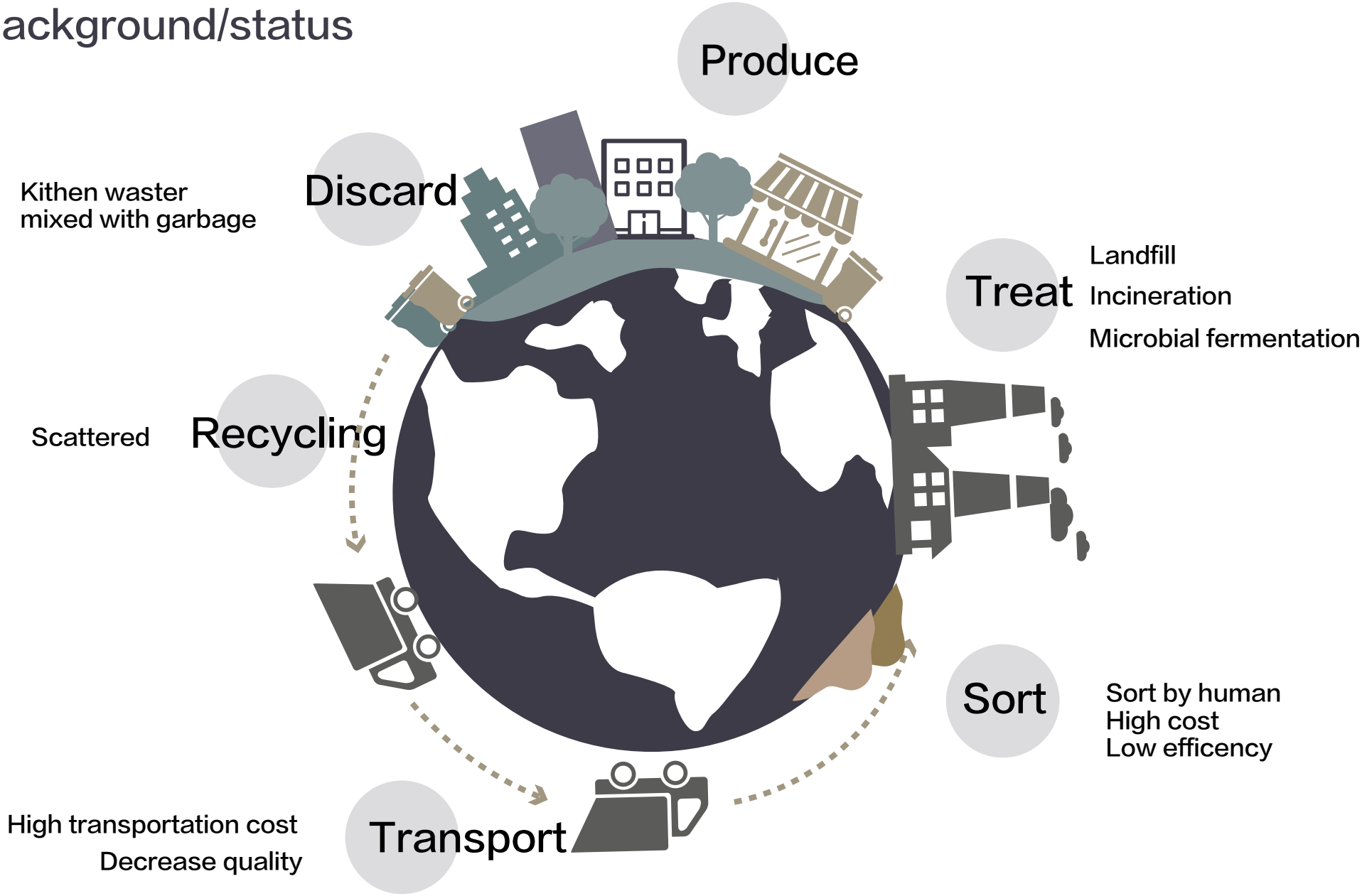
Kitchen waste： Kitchen waste refers to the kitchen waste and waste oil generated during the daily life of the residents and the catering industry.

Kitchen waste in city produced6000Ton / Day

56%produced by Food Industry

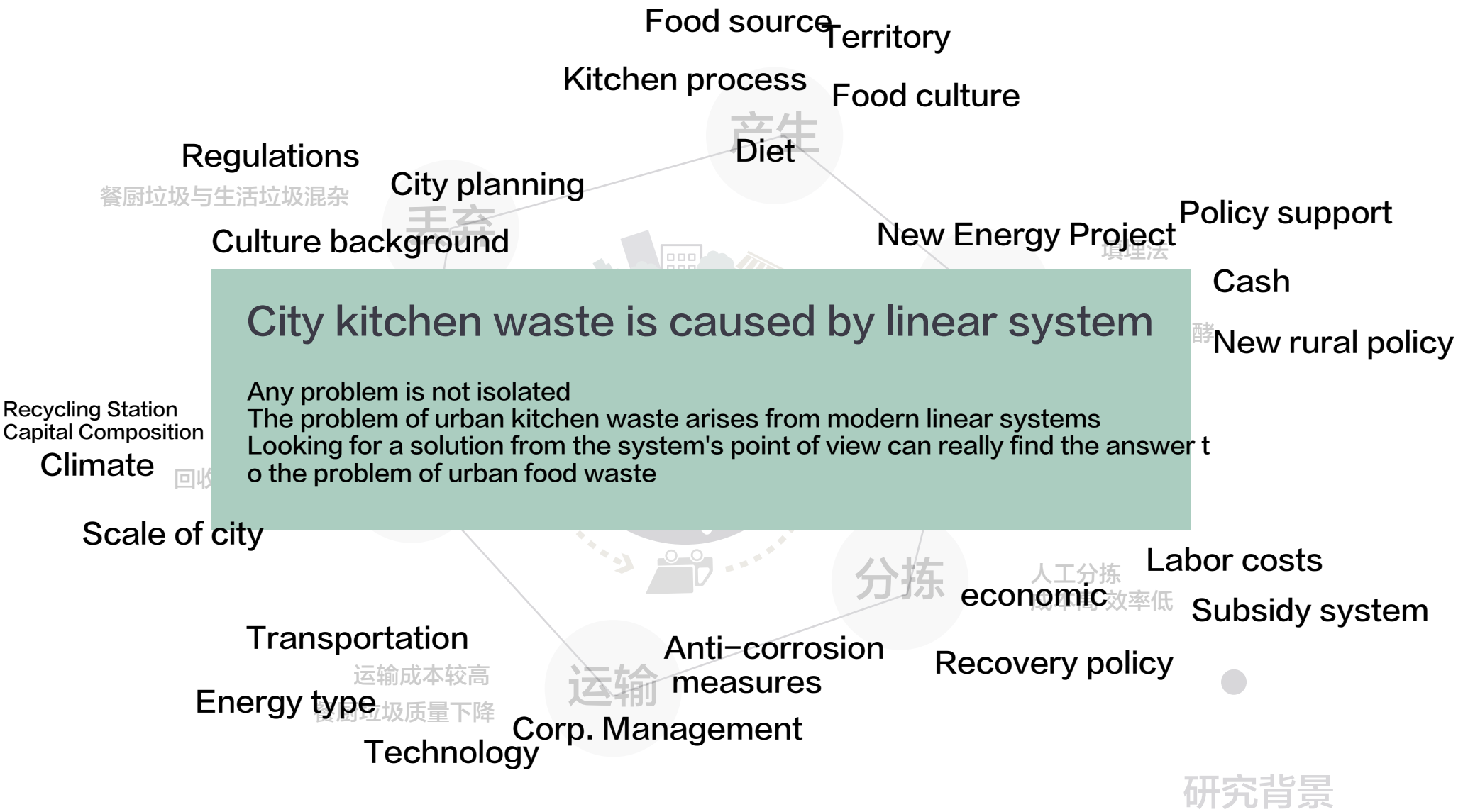
*Reference:Hu Xinjun, Zhang Min, Yu Junfeng, Zhang Guren. Current situation, problems and countermeasures of Chinese restaurant kitchen waste disposal[J]. Chinese Journal of Ecology, 2012, (14):4575–4584.

Background/status



*Reference:Zhang Qingfang, Yang Linhai, Zhou Dandan. Overview of waste treatment technology for food waste in kitchens[J]. China Biogas, 2012,(01):22-26+37.

Background/status



Backgroud / Literature Review

17%

Produce 产生 | 8

Produce

15 | 餐厨垃圾与生活垃圾混杂 丢弃 Discard

回收地点分散 回收 Recovery

Dispose

17 处理 填埋法 焚烧法 微生物发酵

After Produce

83%

14% Restaurant management and standardization

32% Classification and recovery of urban kitchen waste

23% Treatment technology and method of kitchen waste

21% Urban kitchen waste disposal system and policy

分拣 人工分拣 成本高 效率低

运输成本较高

Sorting 6

Background/status

Produce

50%

Processing produced scrap

50%

Rest Food From table

*Reference:Xiong Ting, Wenwen Huo, Liou Dou, Gao Yang, Chen Wei. Research on the Necessity of Urban Kitchen Waste Recycling Treatment[J]. Environmental Science and Management, 2010,(02):148–152+190

Background/scope

Vegetarian VS Traditional

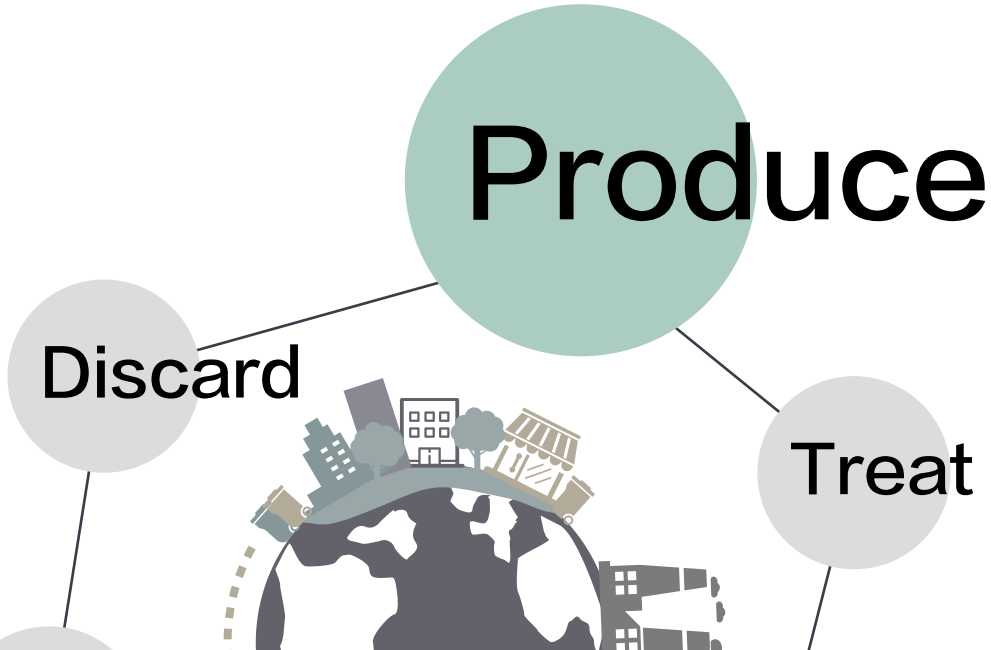
Small restaurant
Simpler kitchen process
Higher value of food waste

High oil and salt content
complex Kitchen process
Food waste fluctuations

*Reference:Xiong Ting, Wenwen Huo, Liou Dou, Gao Yang, Chen Wei. Research on the Necessity of Urban Kitchen Waste Recycling Treatment[J]. Environmental Science and Management, 2010,(02):148–152+190

Background / scope

systematic design research methods
Aiming at the **optimization of the kitchen flow**
for the research base in a **vegetarian restaurant**
Qualitative and Quantitative Analysis of Kitchen Waste Production
Optimize kitchen processes to achieve **"zero emissions"**



History and Territory

Research/History

Chinese diet characteristics

Large differences in diet between North and South

Variety of cooking methods

No uniform standard for cooking methods

*Reference: The development and characteristics of Chinese food culture 金炳镐

Ingredient cuisine

Liquor Red Sauce

Shanghai cuisine is **a kind of fusion cuisine.**
Cooking methods and dishes have been
increasing with time.

40.5% of the migrant population
a wide range of Shanghai restaurants

has not formed a standardized management system.

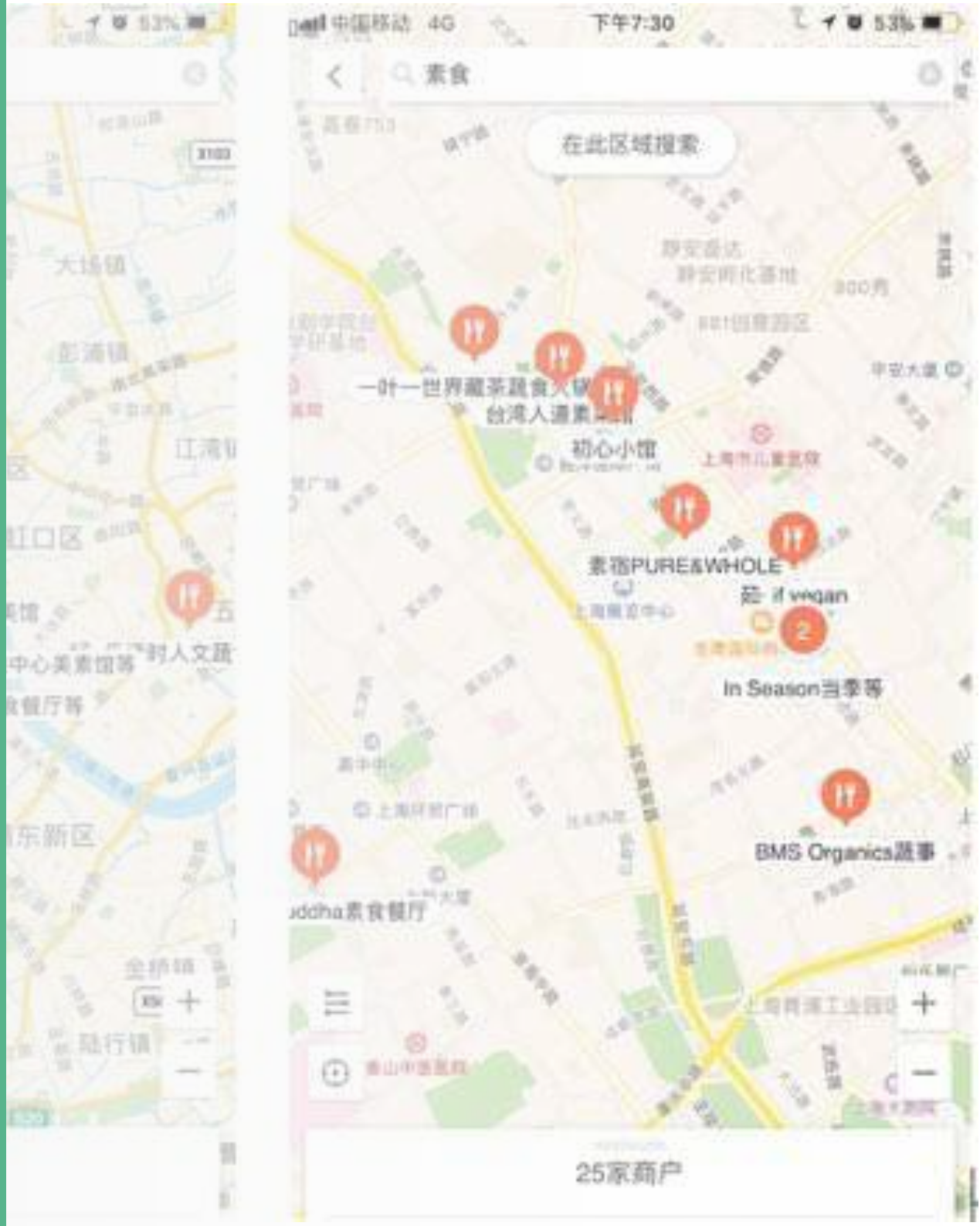



Shanghai Vegetarian culture & restaurants

100 vegetarian restaurants

4 Regions

Huangpu, Pudong, Jing'an and Xuhui.



High coverage, radiating centered on business district

Shanghai expended from south to north and from west to east as industrialization expanded and– mainly located in the business district.

Shanghai's vegetable supply partly comes from the cultivation of irrigated land

● Largest vegetable supply provinces

*Reference:Zhou Yan, Ou Yansong. Study on the status and characteristics of vegetable consumption in the Shanghai market[J]. Shanghai Journal of Agricultural Sciences, 2016,(01):95-99.

Shanghai vegetable supply is obviously seasonal

Largest supply from December to January

Smallist supply from July to September

*Reference:Zhou Yan, Ou Yansong. Study on the status and characteristics of vegetable consumption in the Shanghai market[J]. Shanghai Journal of Agricultural Sciences, 2016,(01):95-99.

90% of leafy vegetables can be self-sufficient

90% of Shanghai green leafy vegetables, solanaceous vege-tables, and bean products are provided by local arable land in Shanghai, and most of the rest are from cultivated arable land.

90%

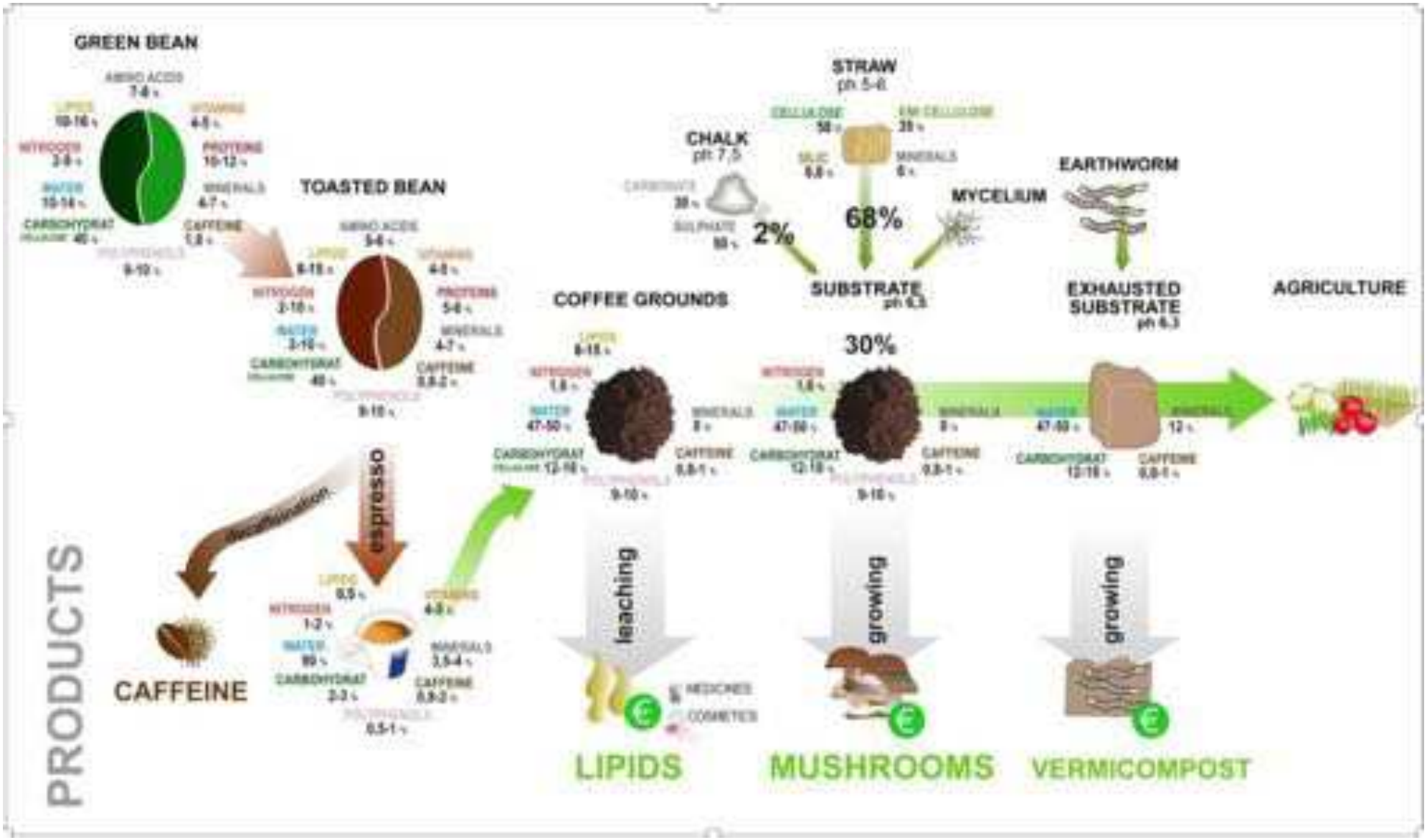
10%

*Reference:Zhou Yan, Ou Yansong. Study on the status and characteristics of vegetable consumption in the Shanghai market[J]. Shanghai Journal of Agricultural Sciences, 2016,(01):95-99.

Case Study

- Case Study

1 Recycling coffee grounds of Lavazza



*Reference:Bistagnino L., Design Sistemico, progettare per la sostenibilità produttiva eambientale, Slow Food Editore, Turin, 2011

Case Analysis

1 Recycling coffee grounds of Lavazza

Advantage

Method for analysis

Supply method for the analysis and application of the components of vegetarian food waste.

Method for analysis

Reused elements copporate to different qualities

Disadvantage

Energy consumption

Unclear about the energy consumption during transport/storage/seperation process of coffee grands

Case Study

ToolKit and Typical one day

2 XINGBAO Nursing house service design

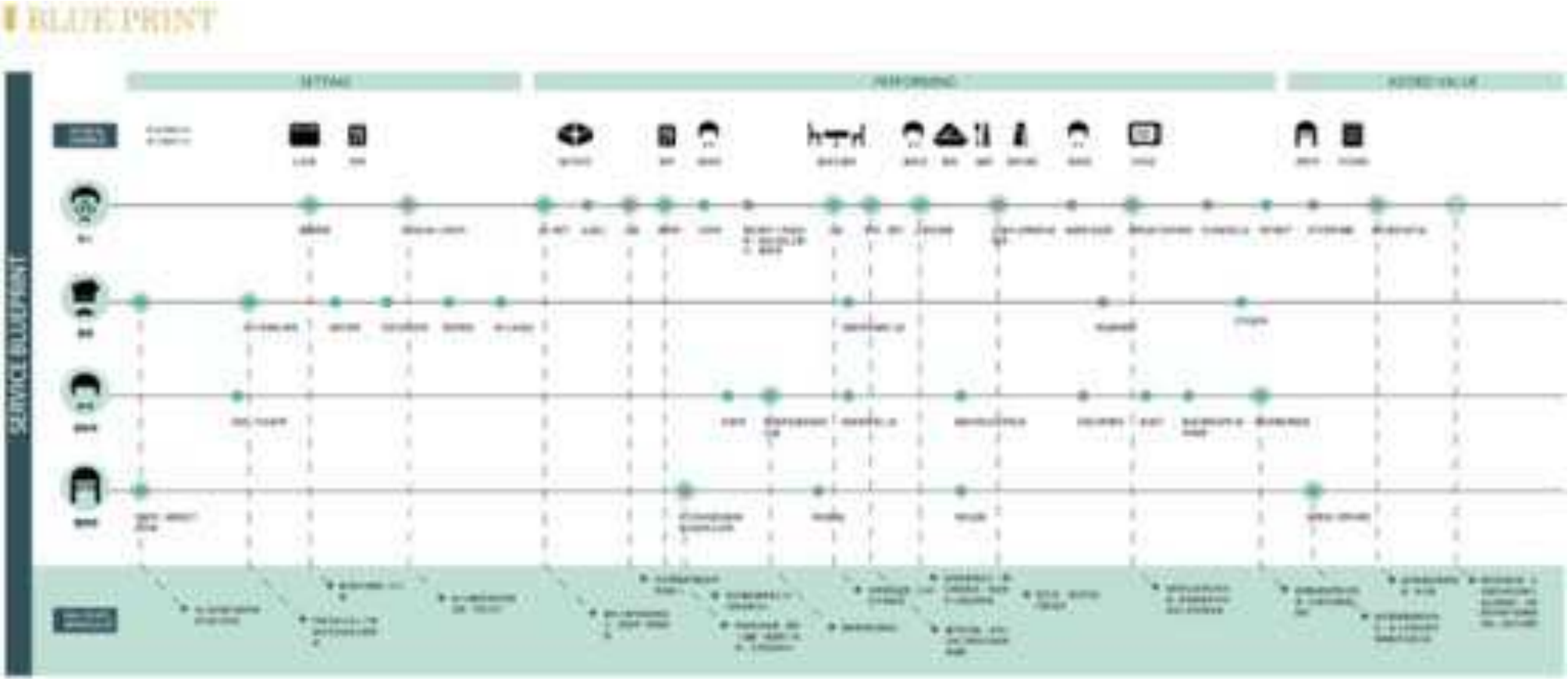
SELF-INTERVIEW	FOCUS GROUP	OBSERVATION	SELF-RECORD	Q&A
9	7	N	6	10
5U 4S	6U 2S	NU NS	6U 0S	0U 10S

TOOLS

Case Study

Blue Print and Touch Point

2 XINGBAO Nursing house service design



Case Analysis

2 XINGBAO Nursing house service design

Advantage

Typical One Day

Provide “Typical day” and “Toolkit”for research which could used for collecting info of LOHAS

Toolkit

Blue Print

Blue Print and Touch Point are good tools to analyze process in timeline and relationship between stackholders

TouchPoint

Disadvantage

Toolkit is Not Easy to Use

The toolkit is more complicated to use and could be simplied considering stuff would be to busy to use.

No fine measure

This method can only be used for qualitative analysis and does not help us to finely measure

3 Enzyme Making in GUOZHIMANMAN

“GUOZHIMANMAN” is a fresh juice chain beverage store, which mainly uses fresh extracts of seasonal fruits to promote a healthy light diet.

Case Analysis

3 Enzyme Making in GUOZHIMANMAN

Advantage

Enzyme Making

The use of high-quality vegetable and fruit crumbs for the production of fruit enzymes avoids the waste of fruits and vegetables.

Diversified Economic

At the same time, the resulting by-products bring a diversified economic structure to beverage shops.

Disadvantage

High Energy Cosuming

High energy consuming during transportaion and storage

No fully utilize/No associated

No fully utilize high quality fruit waste, and it is not associated with the surrounding commercial ecology.

LOHAS
Research and measurement

Research / content

Obersvation

12h+Observation

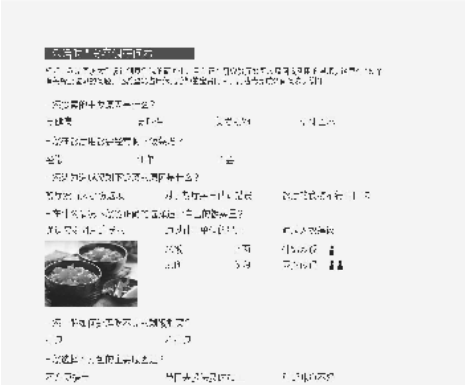
Data collect
Process record
Kitchen waster producing

Interview

2.5h+Interview

Kitchen process
Kitchen management
Resources waste

Questionnaire



25+Questionnaire

Waste sorting
Structure of customer

Research / content

9:00AM–1:30PM

4:30PM–7:30PM

Observation

- Measurement
- Process and record
- Produce and sorting
- Water usage
- Spaial layout

Research / content ● 9:00AM–10:00PM ● 2:00PM–3:30PM

Interview

- Main responsibility
- Process
- waste sorting
- Water usage
- suggestion of manageme
- Menu&customer

-关于餐厅工作人员
-餐厅共有多少位员工?
-餐厅工作人员是否有固定的岗位与工作?
-餐厅工作人员多久流动一次?
-什么岗位的工作人员与餐厨垃圾分类关系最大?

工作流程

职位
工龄

-后厨流程与垃圾分类情况
-您主要负责后厨流程中的哪部分工作?
-您的工作流程是否有严格的规定?
-您对菜谱的定量化设置如何看待?
-您认为哪些步骤环产生的餐食垃圾最多?
-您认为哪个步骤所造成的水资源浪费最大?
-您在工作过程中是否有垃圾分类的意识?
-目前您是如何进行餐厨垃圾分类的?
-您认为在学习垃圾分类的过程中最大的困难是什么?
-您认为在实际操作过程中有哪些问题?是否有不便之处?

-关于餐厅食材与餐单
-您如何确定每次购买食材的量与种类?
-您如何储存未能被用完的食材?
-餐厅目前何种食材浪费最大?造成这类食材浪费的最大原因是什么?
-餐厅的菜单多久变化一次?变化的原因是什么?

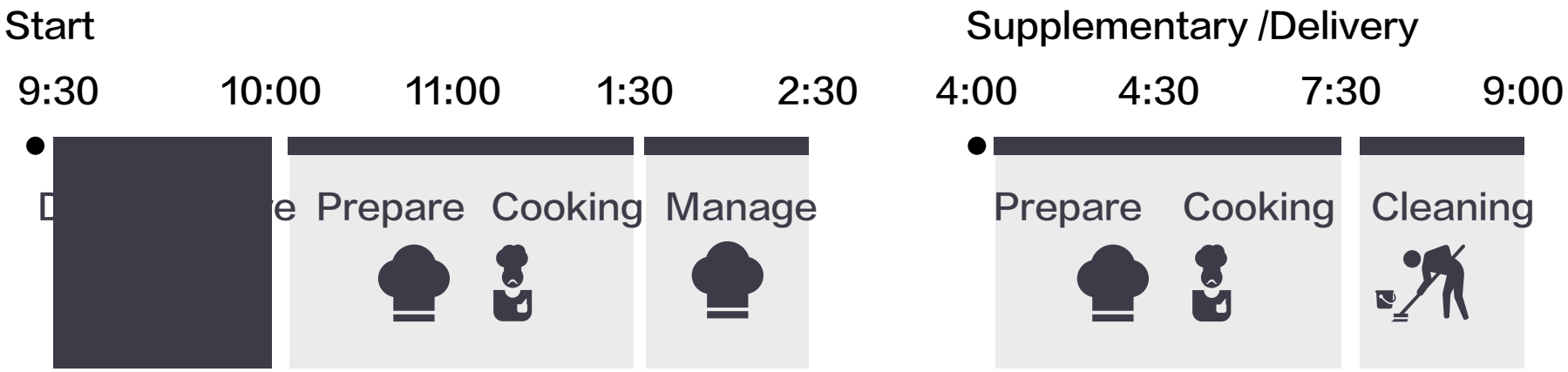
-关于餐厅的客人与食物
-餐厅什么时间客人最多?什么时间客人最少?
-餐厅客人经常点的菜品有哪些?
-菜品的菜是否有定量化规定?如何确定大小分?
-客人是否会经常剩下饭菜?会经常剩下何种饭菜?
-您一般如何处理客人剩下的饭菜呢?
-您认为现在的流程可以如何改善?

Research / content ● 11:00PM–1:30PM ● 5:30PM–7:00PM

Questionnaire

- About sorting of waste
- Activity acceptance

Research / content



Research / Menu

MENU SETTING

LOHASTIME MENU IN JANUARY

Appetizer

Double Flavored Ear Wax · Lotus Root with Mustard · Italian Fruit and Vegetable Tower
Quinoa Salad · Nut Salad · Cordyceps Flower Mixed with Flammulina Velutipes · Alfalfa Sprouts Roll
Fruit and Vegetable Roll · Japanese Seaweed Grain Roll · Hot and Sour Fern Root Noodles

Hot Dishes

Iron Plate Eggplant · Good Luck Sign · Dictyophora Asparagus · Mapo Tofu · Mixed Tofu
Kroraina Fragrant · Braised Vegetables with Chili Sauce · Okra with Great Burdock
Stir Fried Lentils with Mushrooms · Chiba Tofu Pot · Fried Eel · Fungus Sponge Gourd
All-inclusive · Mushroom Pot · Boiled Okra · Stir-fried Broccoli · Lotus Pond
Boiled Chinese Broccoli · Curry and Vegetable Casserole · Vegetarian Diet · Rise Step by Step

Dessert

The Brown Mushroom Bread · Purple Potato Bread · Brown Sugar Oat Bread · Sago with Fruit

Soup

Yam Soup Dictyophora · Italian Vegetable Soup · Towel Gourd Okra Medlar Soup

Main Dishes

Spicy Fried Rice · Lohas Fried Rice · Mixed Vegetables Pine Nuts Fried Rice · Noodle Soup
Bodhi Hot Spring Egg Fried Rice · Taiwan Handmade Noodles · Spaghetti · Rice

Drinks

Taiwan Oolong · Green Tea With Mint · Rose Gold Puer Tea · Fresh Cucumber Juice
Korean Pomelo Tea · Caramel Bubble Black Wort · Germany White/black Wort
Fresh Apple Juice · Fresh Carrot Apple Juice · Slimming Kiwi Wheat Grass Juice

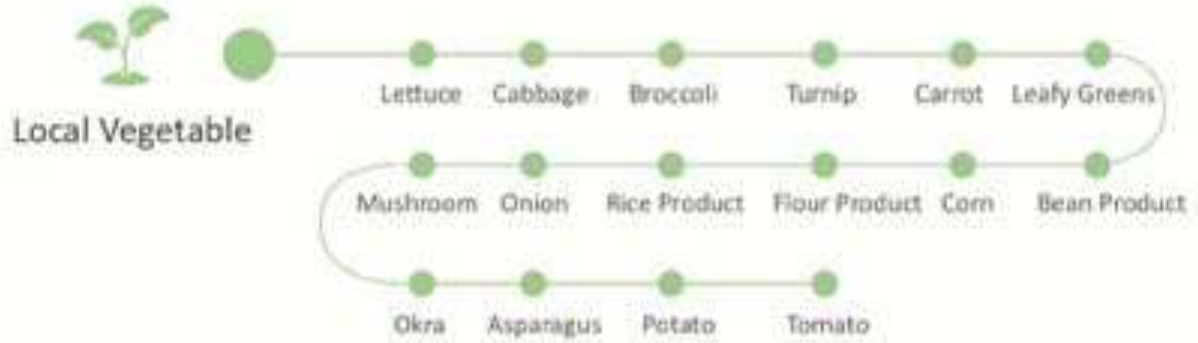
Source of vegetables

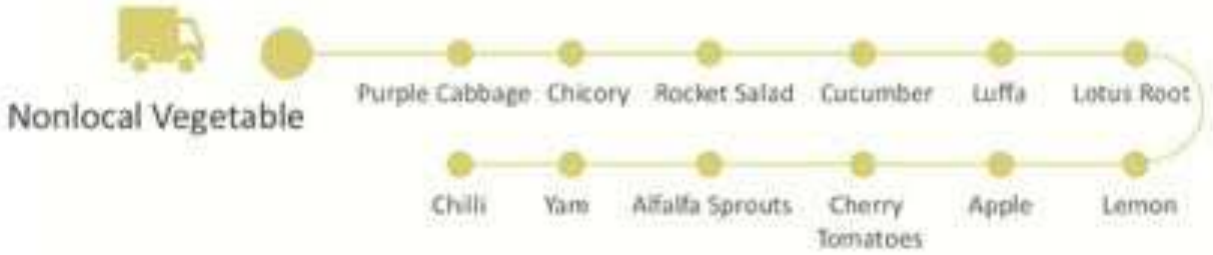
VEGETABLE RESOURCES

Vegetable Market：湖南路农贸市场

VEGETABLE RESOURCES OF LOHAS

The supply of vegetables in Shanghai is of a seasonal nature.
The green leafy vegetables are completely supplied by Shanghai from January to January.



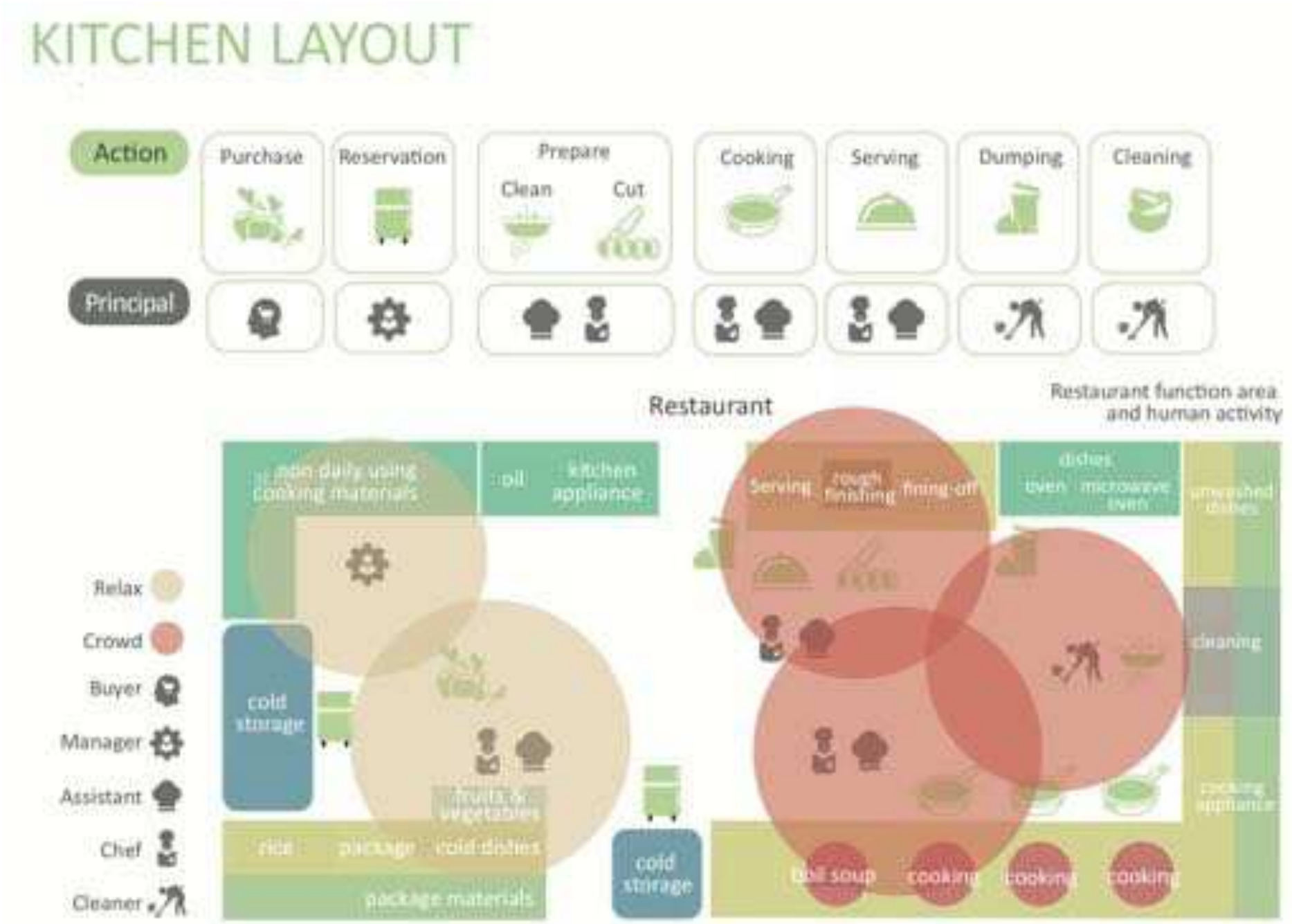


*Reference:Zhou Yan, Ou Yansong. Study on the status and characteristics of vegetable consumption in the Shanghai market[J]. Shanghai Journal of Agricultural Sciences, 2016,(01):95–99.

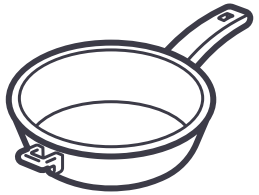
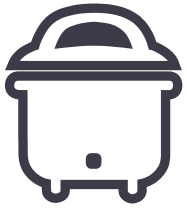
Vegetable price table

classify	variety	unit price	amount (kg)	cost/month	cost/day
fresh vegetable	lettuce	4.99	50	249.5	8.3
	red cabbage	4.9	45	220.5	7.4
	3122175	2.69	75	201.8	6.7
	witloof	9.9	30.3	300.0	10.0
	Eruca sativa	7.99	44.6	356.4	11.9
	carrot	1.69	74.5	125.9	4.2
	white radish	1.39	90	125.1	4.2
	cucumber	2.59	44	114.0	3.8
	Lotus root	4.99	58.9	293.9	9.8
	loofah	3.99	36	143.6	4.8
	alfalfa bud	13.8	9	124.2	4.1
	green vegetable	1.9	75	142.5	4.8
	broccoli	3.9	75	292.5	9.8
	potato	2.39	74	176.9	5.9
	tomato	4.99	58.9	293.9	9.8
	asparagus	9.9	26.6	263.3	8.8
	Okra	6.9	37.8	260.8	8.7
	Chinese yam	4.99	50.9	254.0	8.5
	onion	3.99	59.3	236.6	7.9
dry raw material	cordyceps flower	9.9	9	89.1	3.0
	sea Velvet	5.8	5.1	29.6	1.0
	seaweed	10	3.6	36.0	1.2
	mushroom	9.9	60	594.0	19.8
	pepper	1.99	31	61.7	2.1
cereal	quinoa	8.1	6	48.6	1.6
	beans	8.8	15	132.0	4.4
	corn	5.9	60	354.0	11.8
	bean products	4.9	14.6	71.5	2.4
fruit	lemon	6.9	26	179.4	6.0
	apple	4.8	36	172.8	5.8
	cherry tomato	8.9	15	133.5	4.5
staple food	rice	5	60	300.0	10.0
	flour	6	30	180.0	6.0
	rice products	4.5	60	270.0	9.0
	flour products	4.2	62.8	263.8	8.8
				7091.3	**236.4**

- Research / Spatial Layout



- Research / Equipment measurement

Cleaning tank	Soup Pot	Rice cooker	Wok	Clean bucket	Trash Can
61.5L	7.48L	4L	7.48L	26.84L	3.33L
					

Further work

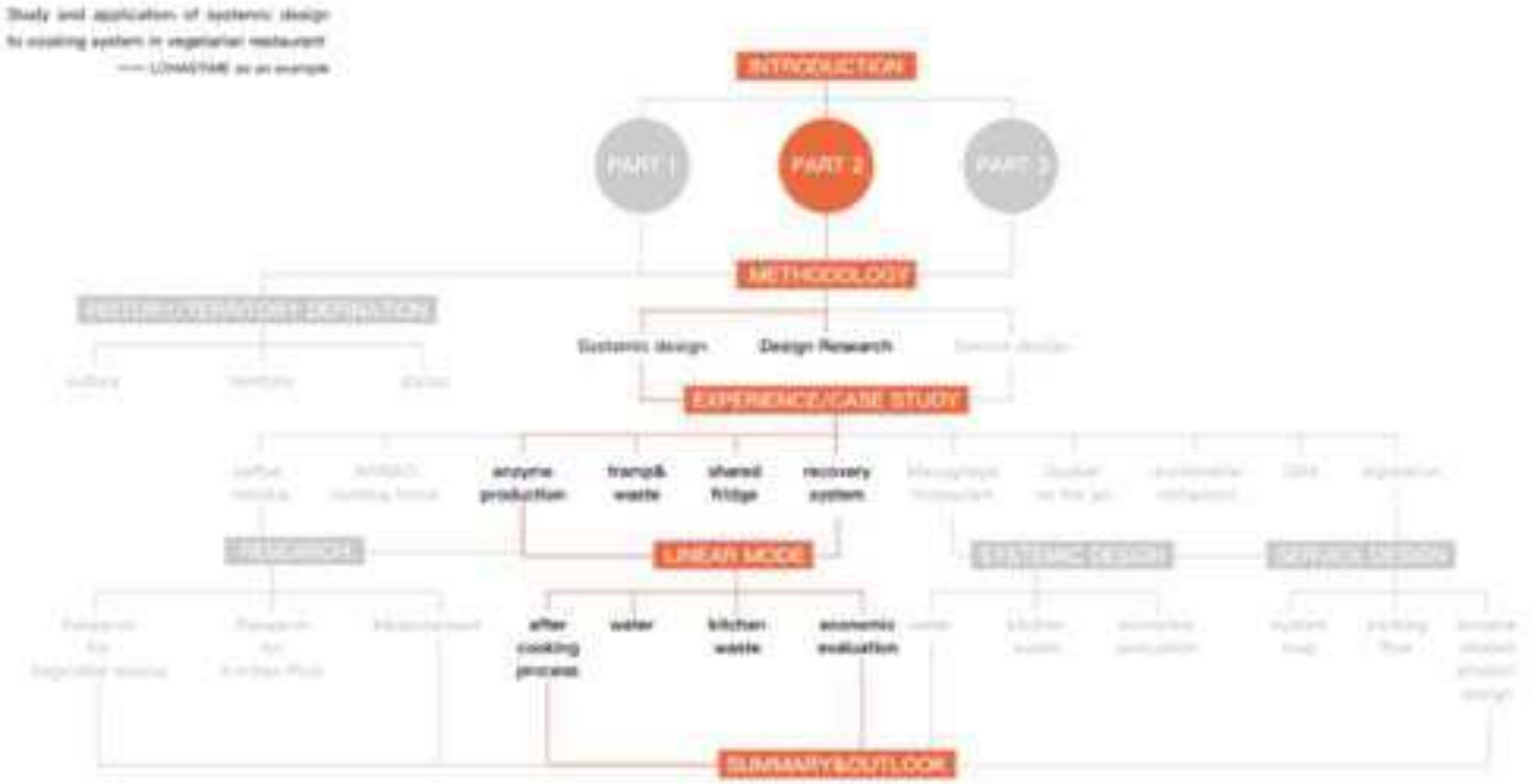
The project members will use the information provided in this article, use the method of system design, further qualitative and quantitative analysis of the linear system of LOHAS, refers to the problems existing in the linear system of the emergence stage, and provide feasibility for further system design and optimization.

Part 2: Linear System – Contents

Zhang Anqi in charge

Part 2: Linear System – Contents

Zhang Anqi in charge

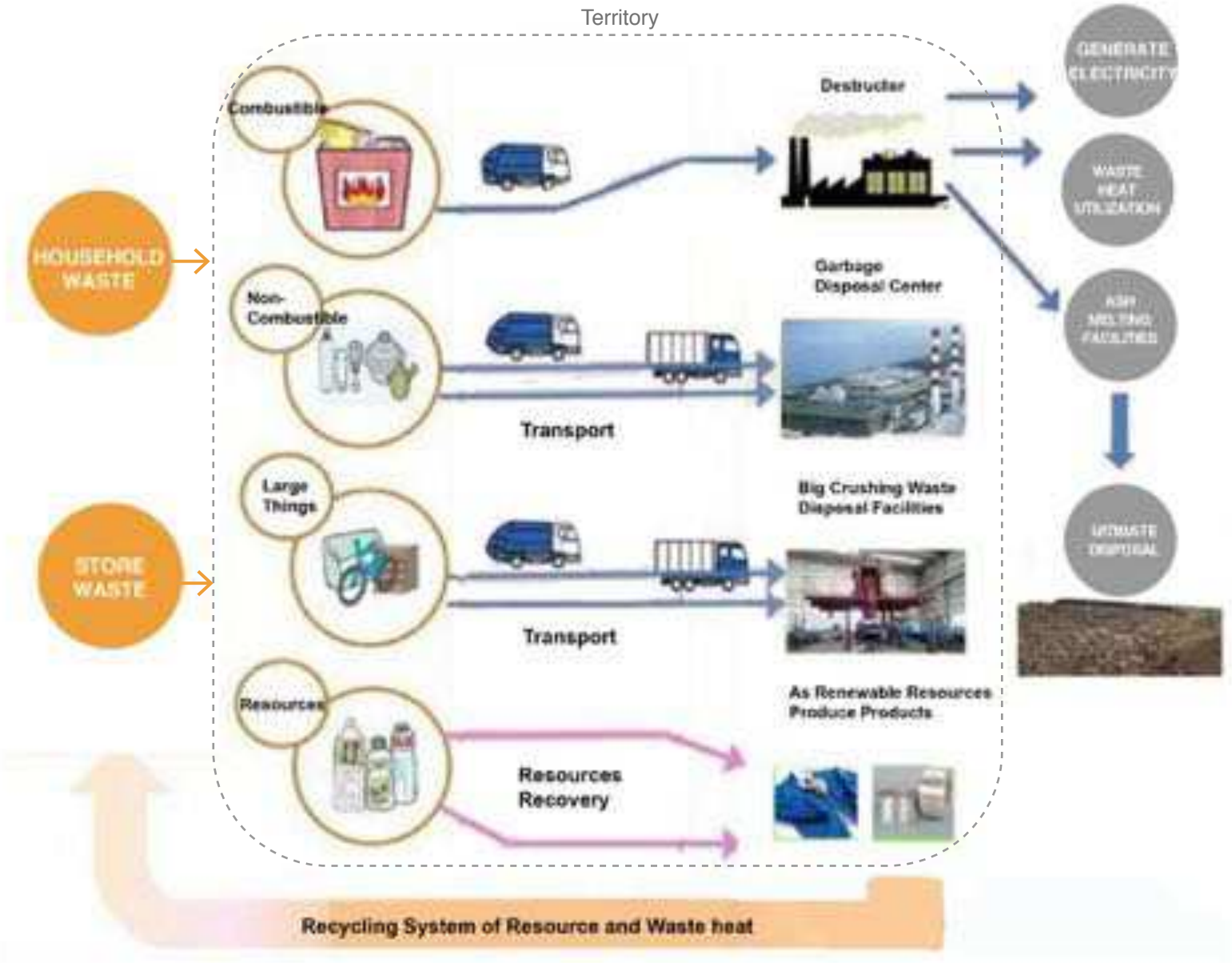


Part 2: Linear System – Key Point

1 Methodology and tools ▸ 2 Experiences & Case Studies ▸ 3 Linear system ▸ 4 Summary and Outlook ▸

2. Experiences & Case Studies

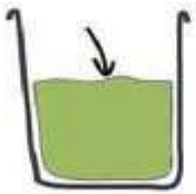
—Japanese Tramp and Waste Resources Related Systems



2. Experiences & Case Studies

—Environmental Enzyme Production And The Case Analysis

Step 1



10 cups of water
Fill 60% of the container

Step 2

Add 1 sugar
= 10% of the water capacity

Step 3

Add 3 fresh garbage
Fill 80% of the container

Step 4

Shut the bottle and fermentation for 3 months

2. Experiences & Case Studies

—Shanghai Street "Shared Fridge" Sharing Food Activities

2. Experiences & Case Studies

—Internet + Renewable Resources Recovery System

Business Model

(1) The front organization

-Organization collector

-Organize sysytem

(2) Middle end link

-Cooperation in the recycle bin

-Car to car docking mode

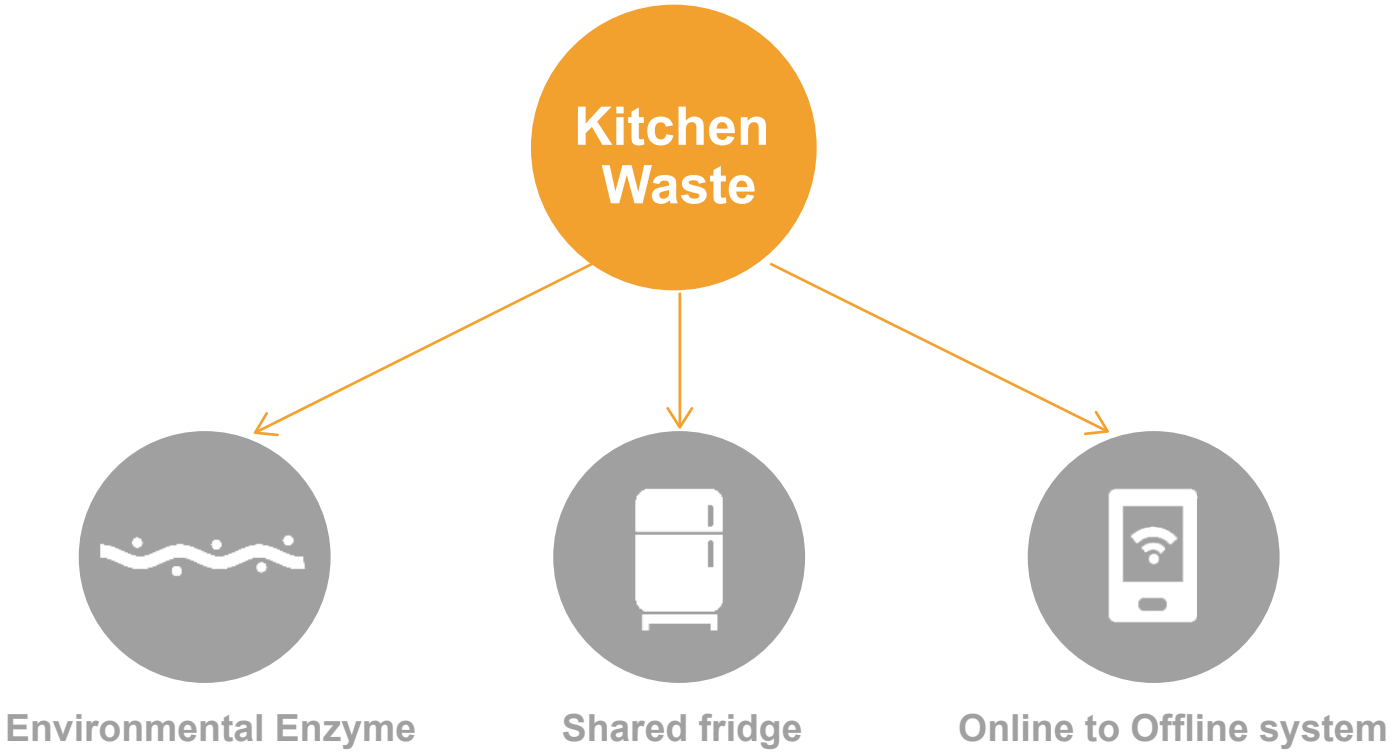
(3) The end of the form

-Combine scrap and waste effectively

-Producers buy credits

Linear System

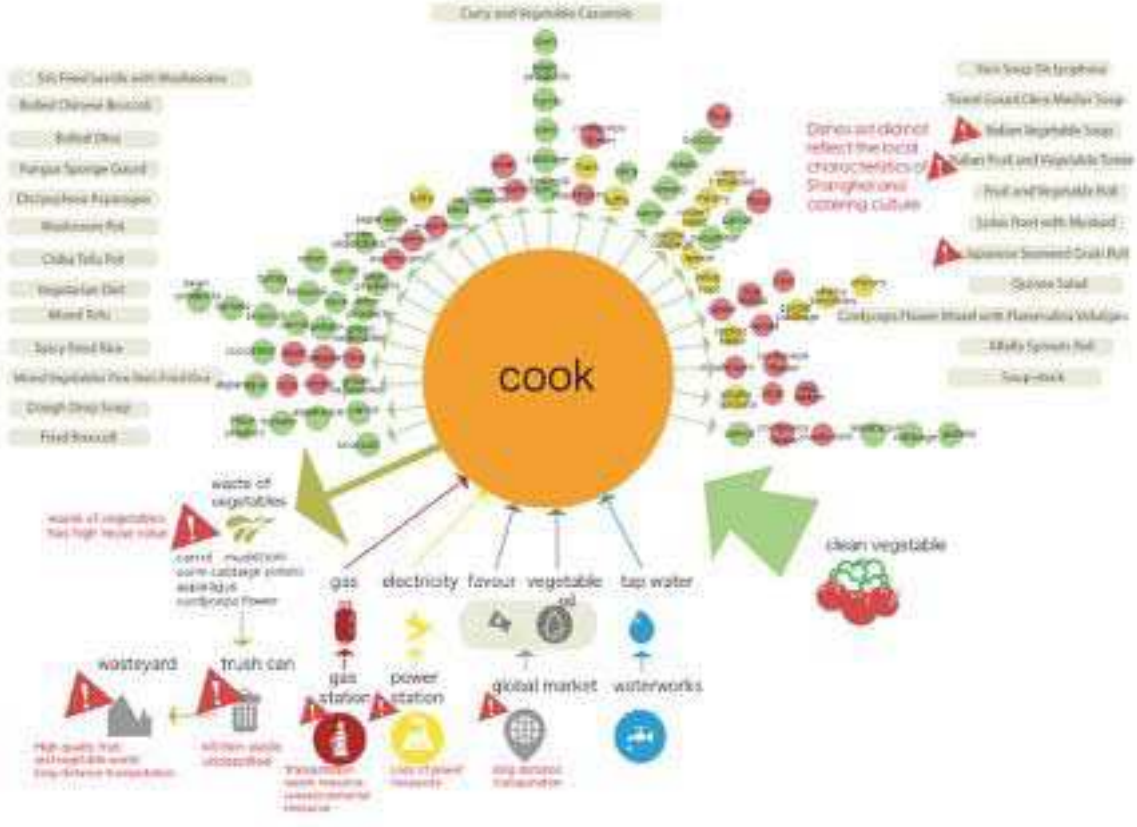
2. Summary of Experiences & Case Studies



- Use resturant kitchen waste to make ***Environmental Enzyme***
- Put resturant kitchen waste in the street ***"Shared fridge"*** for city tramp
- Make resturant kitchen waste into ***Online to Offline system***

3. The Lohastime Vegetarian Restaurant Survey Data Analysis

—The Lohastime Vegetarian Restaurant After Cooking Process



Cooking

STEP 2

3. The Lohastime Vegetarian Restaurant Survey Data Analysis

—The Lohastime Vegetarian Restaurant After Cooking Process

3. The Lohastime Vegetarian Restaurant Survey Data Analysis

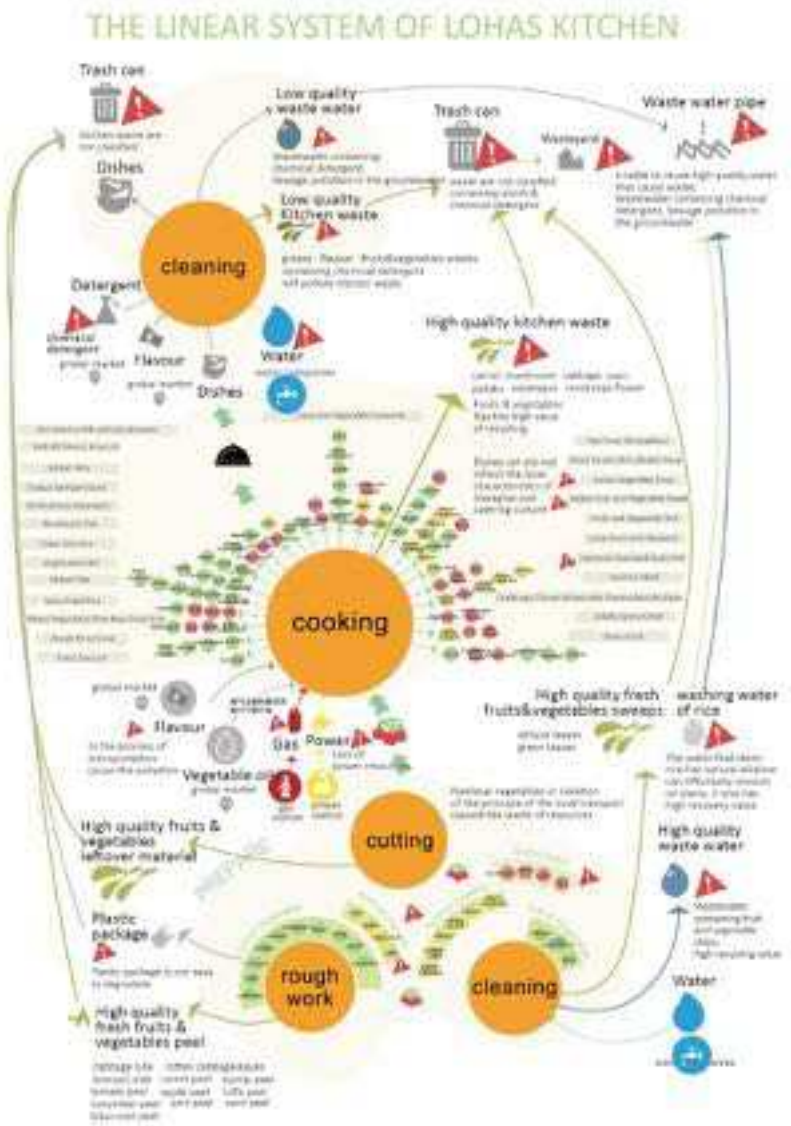
—Water Resource Analysis

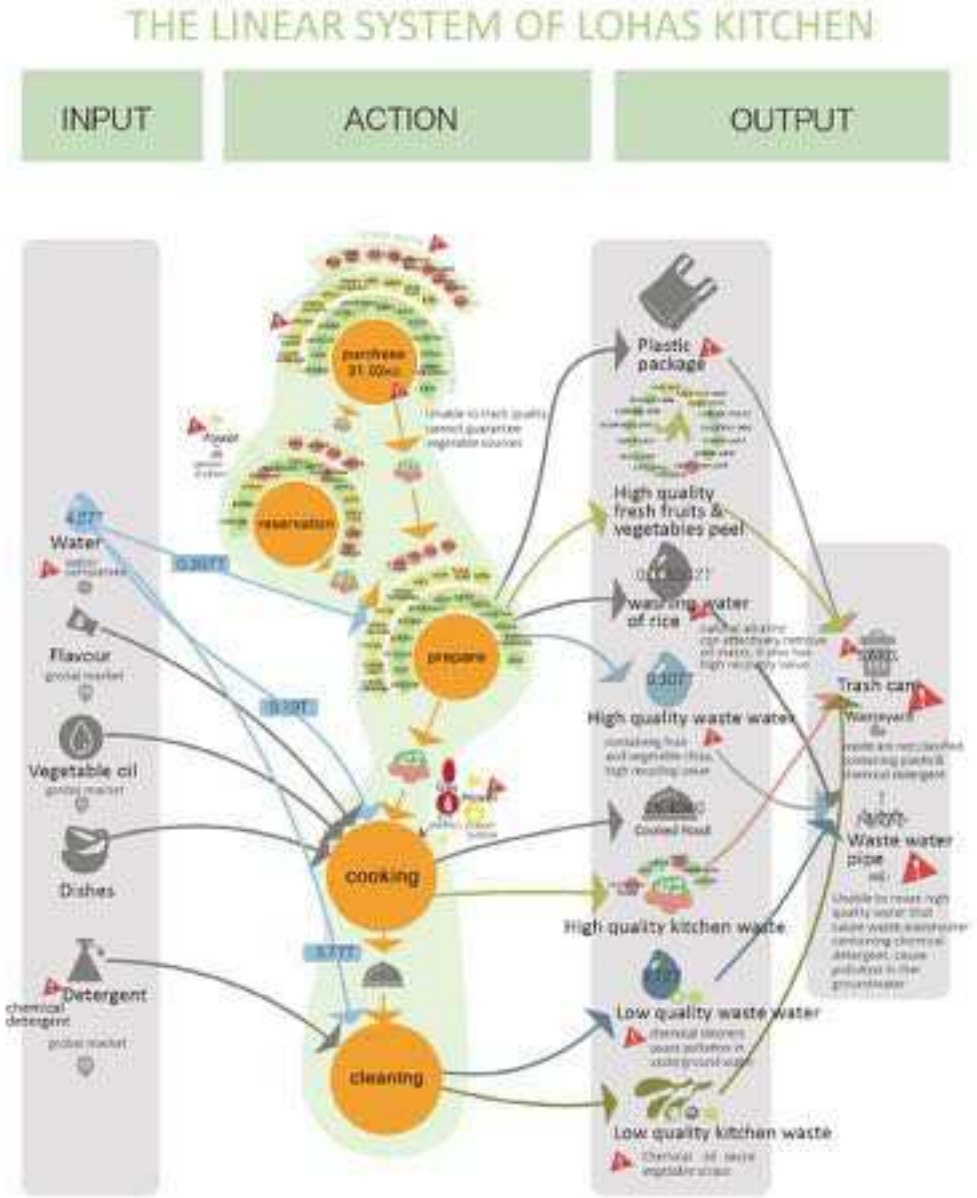
3. The Lohastime Vegetarian Restaurant Survey Data Analysis

— Vegetarian Kitchen Waste Analysis

3. The Lohastime Vegetarian Restaurant Linear System Analysis

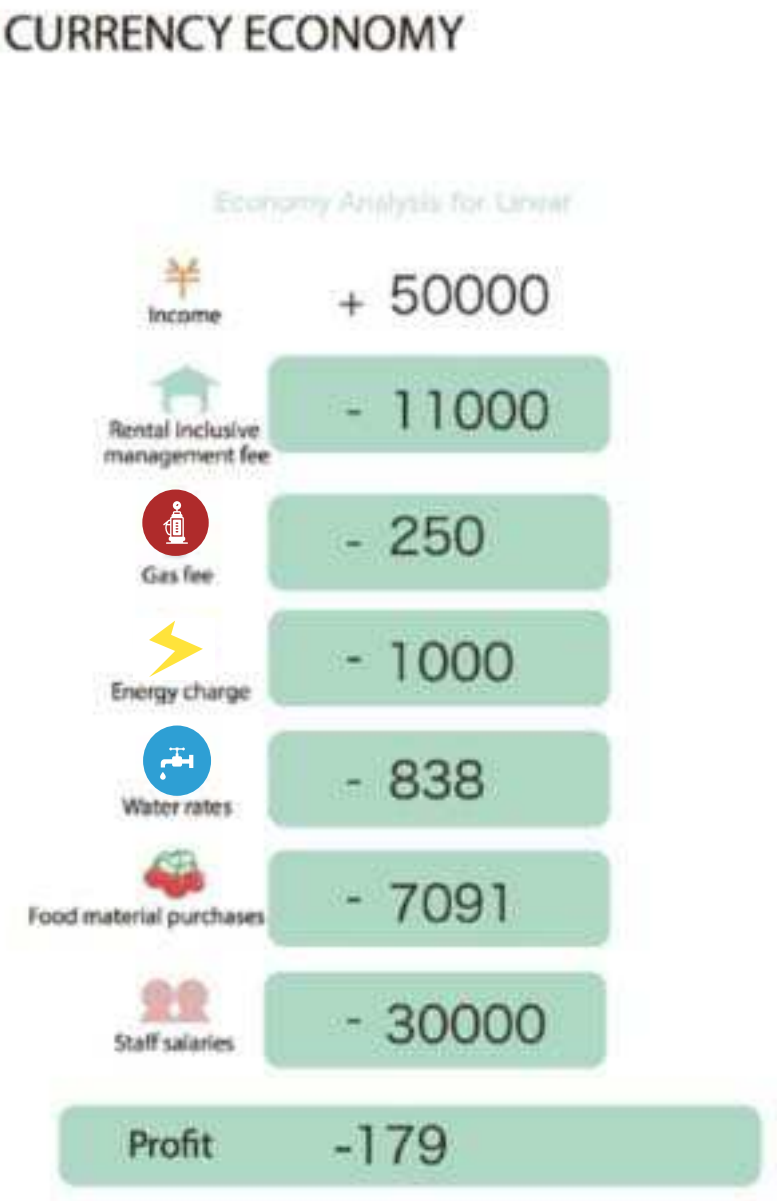
—Linear System Analysis





3. The Lohastime Vegetarian Restaurant Economic Assessment

—Economic Assessment



3. Summary of Linear System

—Problems of Linear System

1 ***The sources of vegetable is instable and have different quality***

2 ***Resource are not fully recycled***

3 ***Space layout is unreasonable***

4 ***Regional cooperation is not close***

Part 3: Systemic Design – Contents

Zhang Qinyuan in charge

Part 3: Systemic Design – Main content introduction

Zhang Qinyuan in charge

1 Methodology and tools ▸ 2 Experiences, Case Studies, and Considerations ▸ 3 Systemic design ▸ 4 Service design ▸ 5 Summary and Outlook

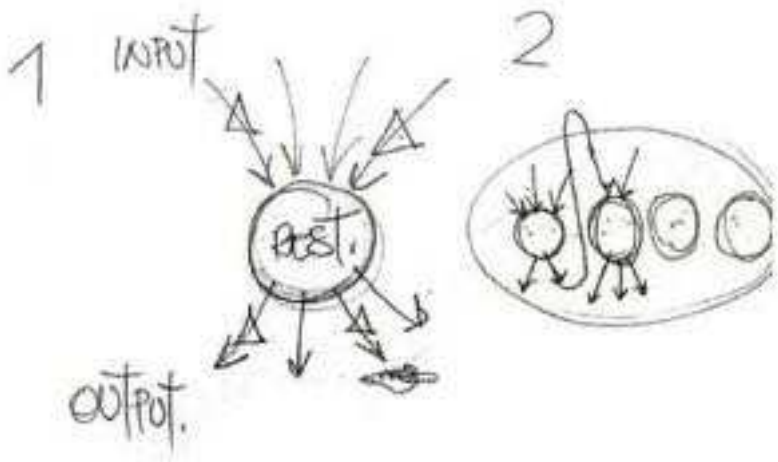
1. Methodology and tools

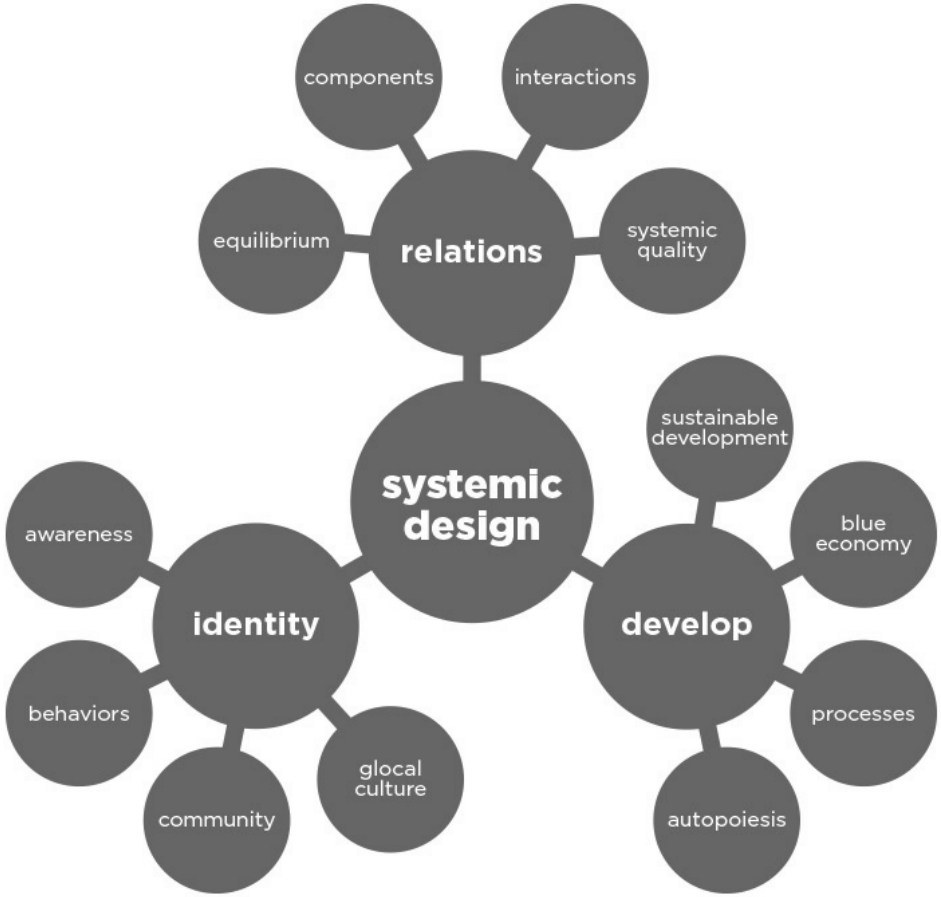
– Systemic Design

What's systemic design?

Significance and value

Methodology

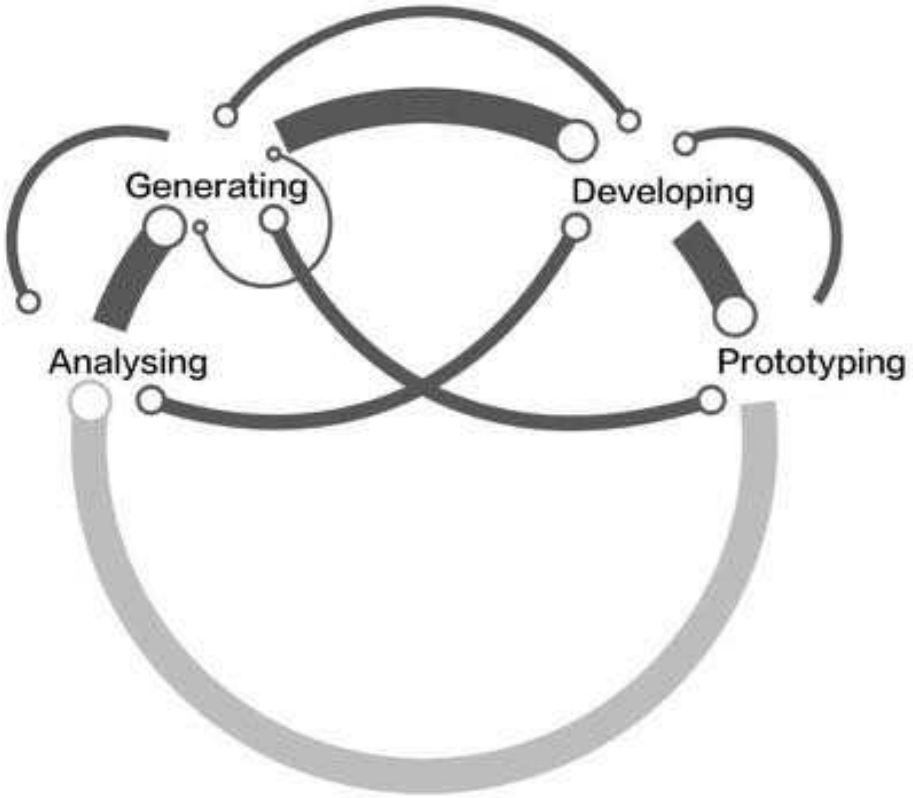




1. Methodology and tools

– Service Design

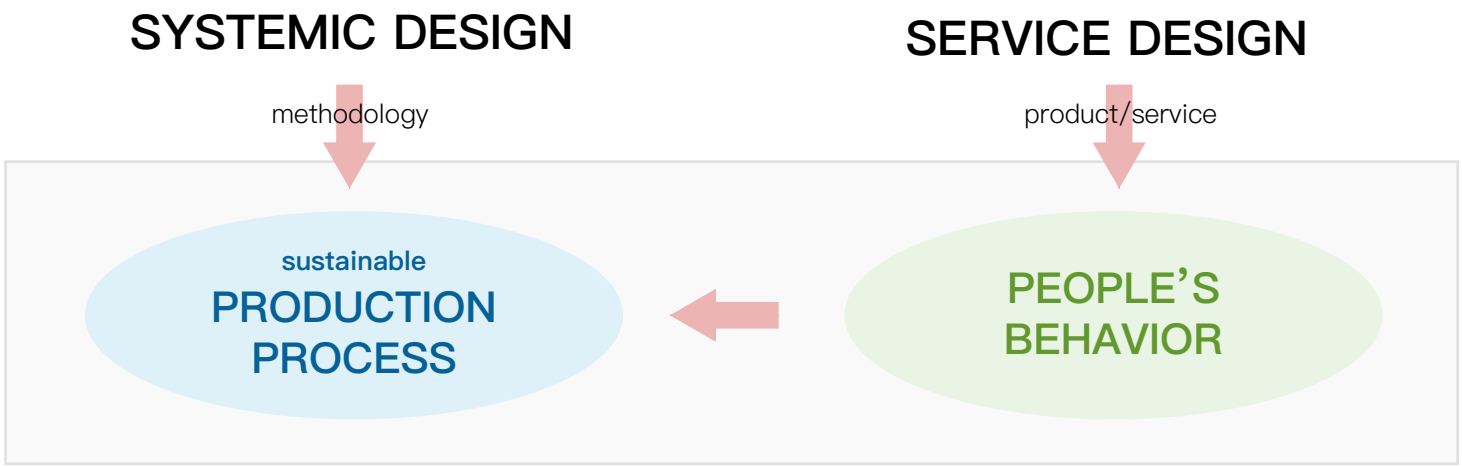
Tools and methodology

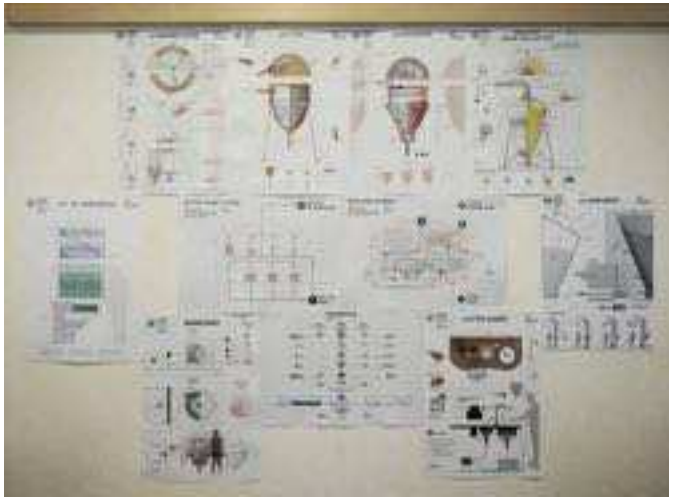


The process of service design is divided into Analysing, Generating, Developing and Prototyping (A. Maroni, D Sangiorgi, 2011)

1. Methodology and tools

– Systemic Design with Service Design





product design from systemic view

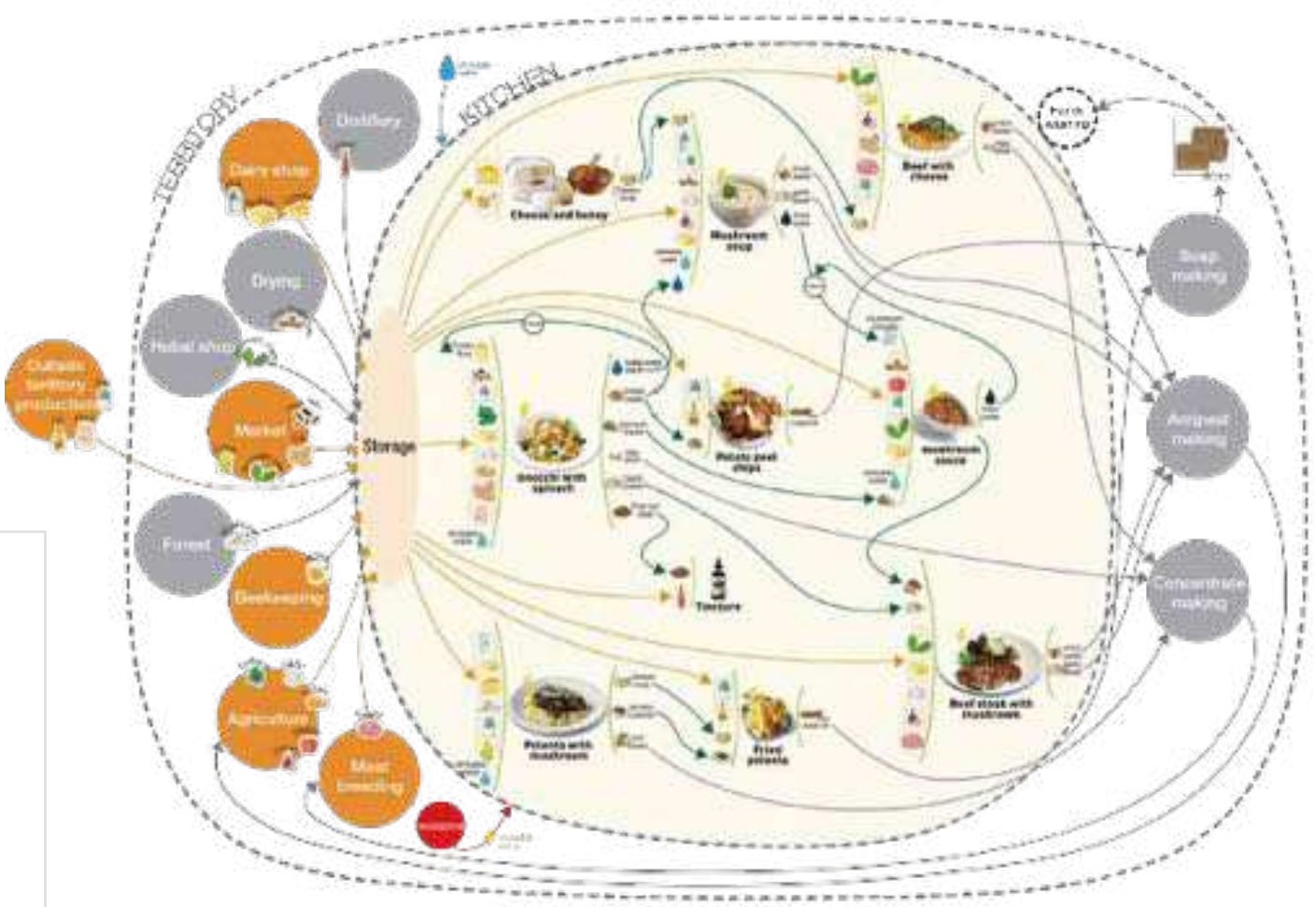
systemic design with service design

2. Experiences, Case Studies and Considerations

– Experiences:

Macugnaga restaurant (Systemic design)

Create a sustainable restaurant which is **reuse resources** as much as possible and close to **zero waste**. In the end, every group will connect with each other and co-create a **community** which is **strongly connect** people with their own **territory**.



MACUGNAGA PROJECT

processes&methods

LOHAS SYSTEMIC DESIGN

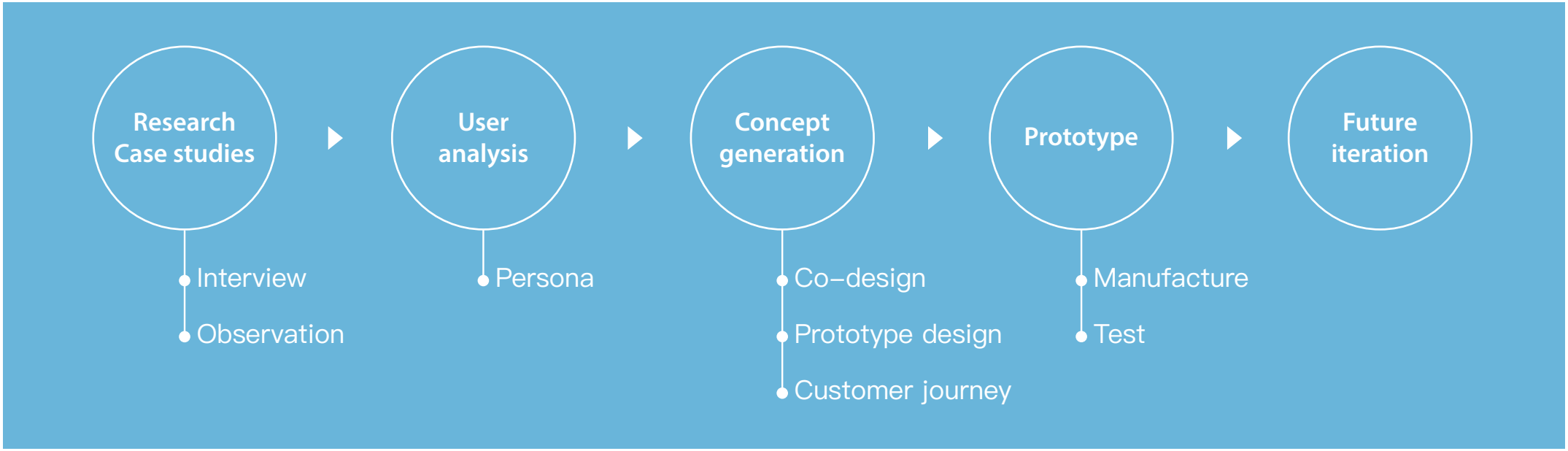
2. Experiences, Case Studies and Considerations

– Experiences:

Quaker breakfast on the go (Service design)

This is a project I participated in when I was studying service design course at Tongji University. In this project, a whole set of service design methods and processes were practiced.

Service design processes:



2. Experiences, Case Studies and Considerations

– Experiences:

Quaker breakfast on the go (Service design)

Research:

There are variety of street breakfast stalls around university. They open early everyday to sell food.

Students always line up to buy street breakfast, taking them away.

Most foods sold in the morning are fried foods, full of oil and calories.

Co-design:

Prototype:

QUAKER PROJECT

service design tools
perspective of process
touch point analysis
iterative idea

LOHAS SYSTEMIC DESIGN

2. Experiences, Case Studies and Considerations

– Case Studies:

Spoonful Of Sugar (Eco–restaurant)

Many of the furniture is made from waste materials.

Sale is based on weight and encourages guests to bring their own containers for purchase.

Rooftop garden circulatory system.

Compost bin.

2. Experiences, Case Studies and Considerations

– Case Studies:

Hutong Kitchen No.44 (Eco-restaurant)

Rainwater collection system.

Water is purified by sand and gravel to the tank for centralized secondary use.

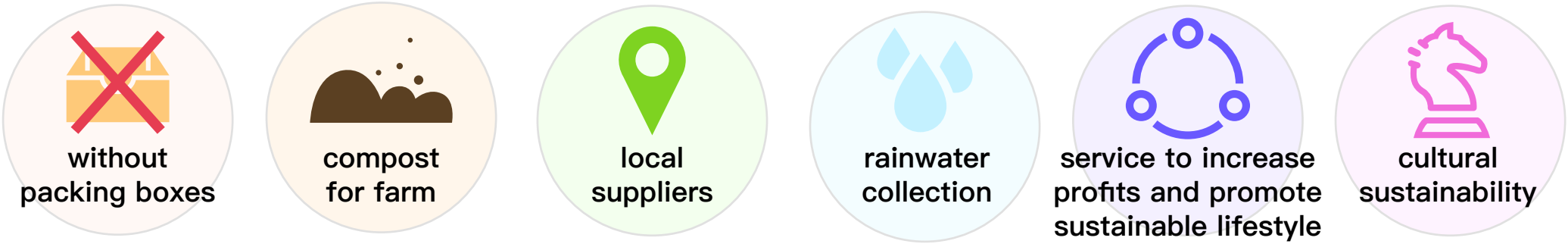
Sustainability of culture: using ancient cooking method.

a small farmer's market in restaurant.

2. Experiences, Case Studies and Considerations

– Case Studies:

Design insights:



Cons:

Not been fully planned from a systemic point of view

2. Experiences, Case Studies and Considerations

– Global Best Practice

GRA (The Green Restaurant Association)

GREEN RESTAURANT® POINTS

Kitchen Sync

4 Star SustainaBuild™ Certified Green Restaurant®

Environmental Category	Points
Energy	215.46
Food	34
Water	33.25
Waste	64.75
Disposables	18.22
Chemical & Pollution	32.9
Furnishing & Building	38.72
POINT TOTAL	**437.3**

Green restaurant certification standards and evaluates the stars and scores for the restaurant.

2. Experiences, Case Studies and Considerations

– Global Best Practice

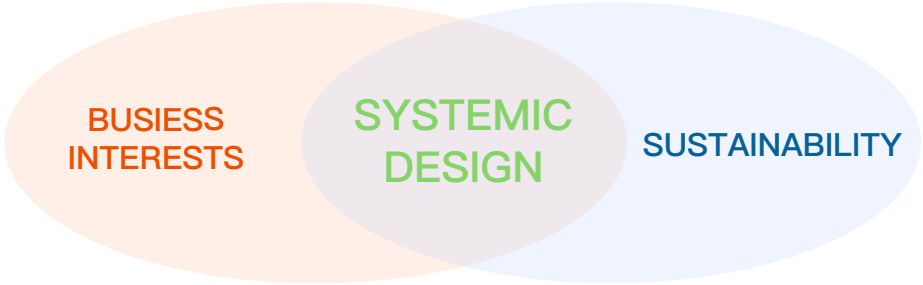
Legislation:

Since the 1950s, Germany started exploring **the use of kitchen waste** to produce organic fertilizers,

Japan's Food Recycling Law

Insights:

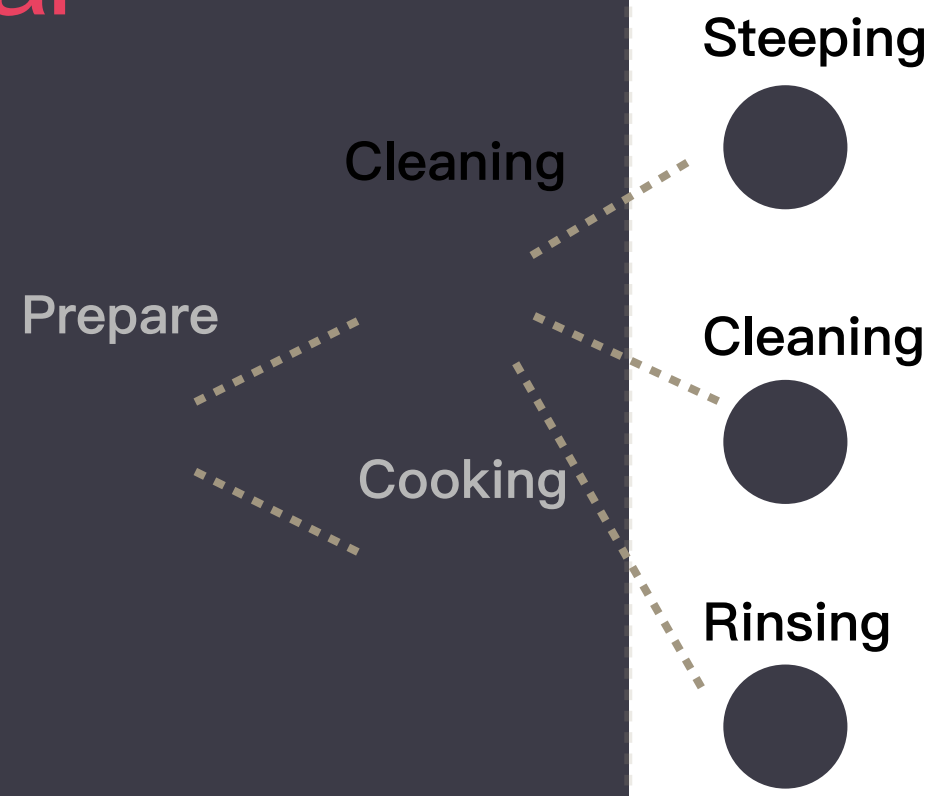
– Foreign countries have already established more mature rules and practices in sustainable restaurants.
– Chinese restaurant operators generally focus on commercial profits.



3. Systemic Design

– Water System:

linear

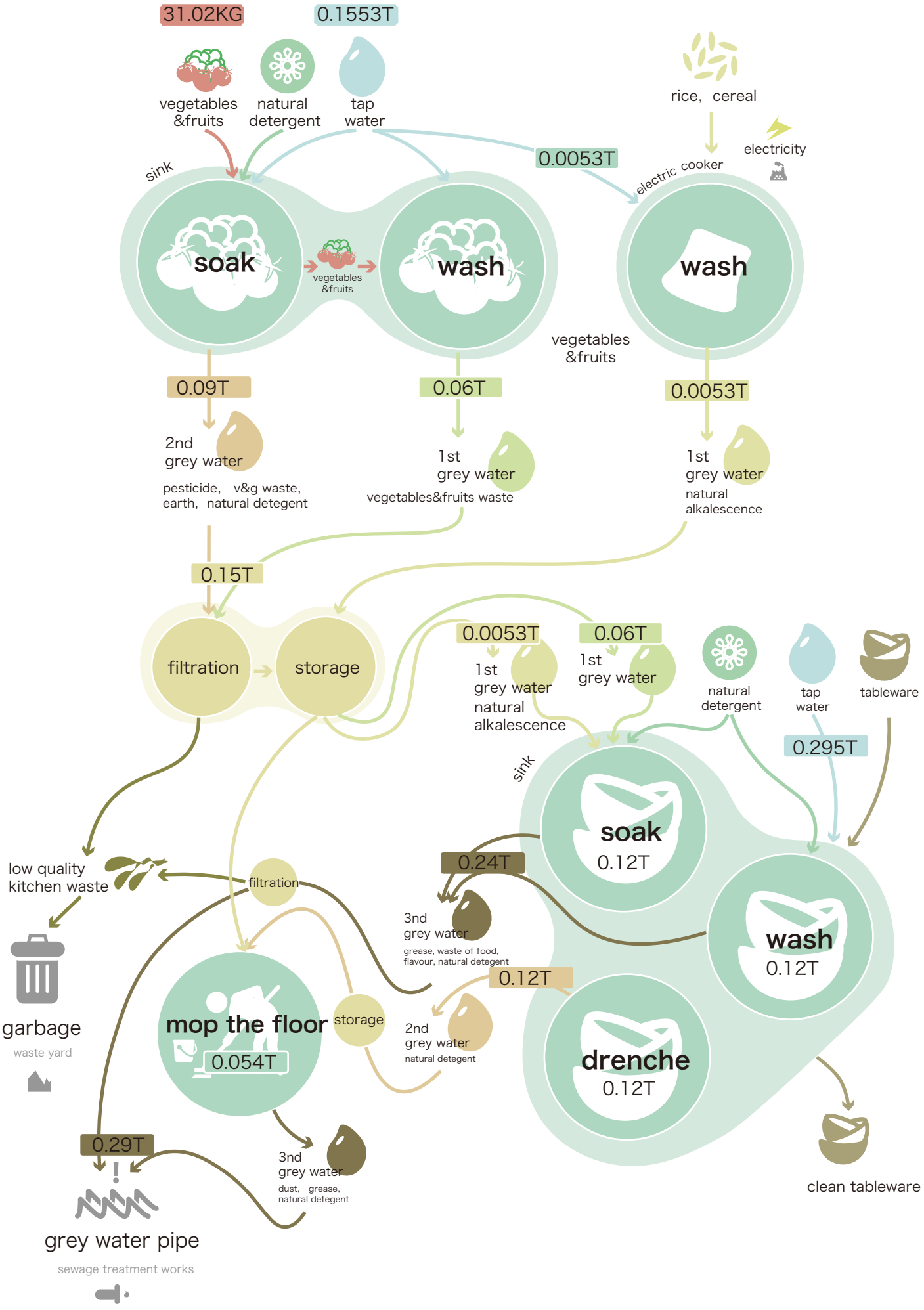


Systemic

Recycling according to the quality and quantity of water

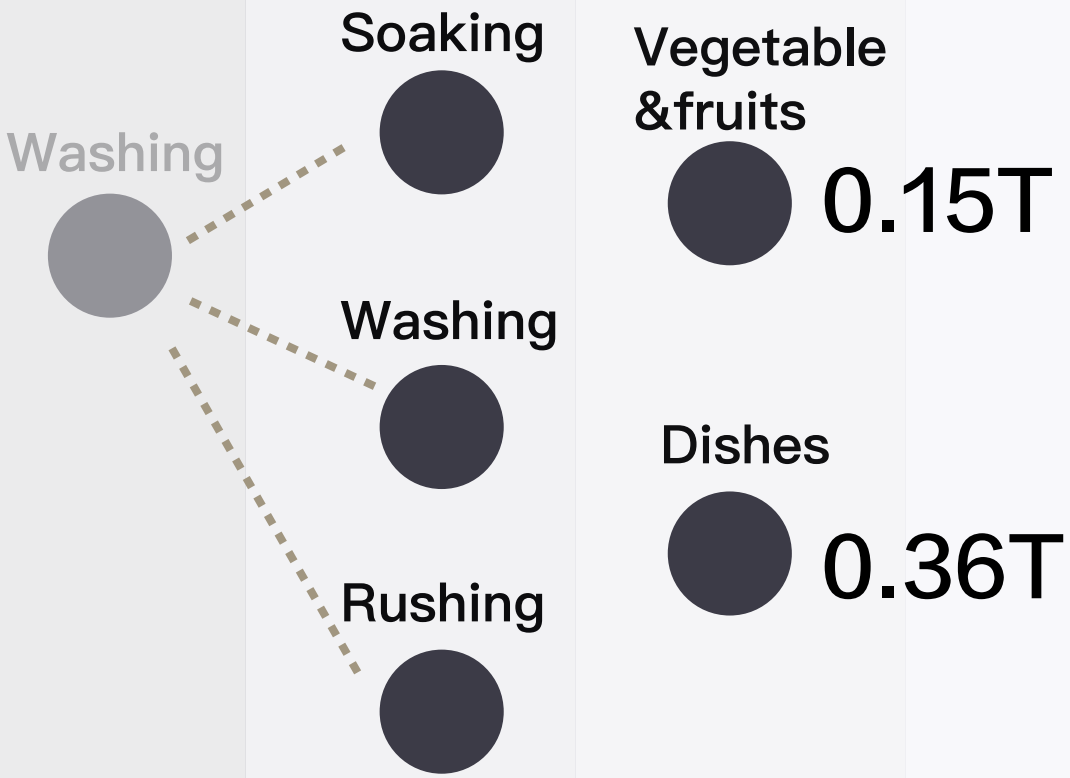
3. Systemic Design

– Water System:



3. Systemic Design

– Water quantity and economic analysis:



Systemic

Compare to linear system

we save:

3.753T water/month

Save 517.9yuan/month

Using a separate sink to clean veg–etables over 400kg can save 48% of water

3. Systemic Design

– Water quantity and economic analysis:

Double sink

￥200～500

Filter unit

￥30

Recycled water storage tank

￥120

1st recycled water

Wash fruits and vegetables / water of washing rice

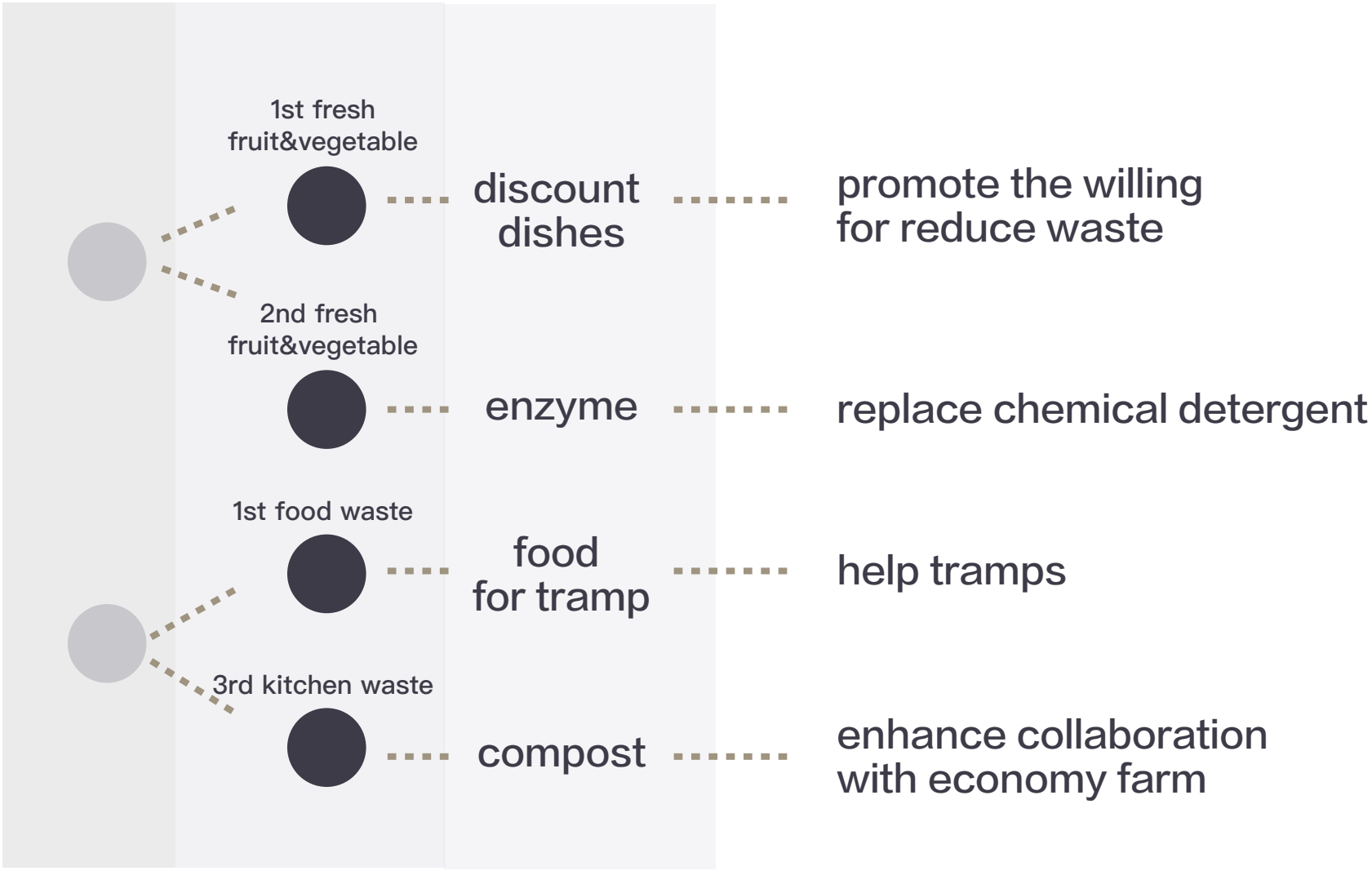
2nd recycled water

Soak fruits and vegetables

Total ￥350～600

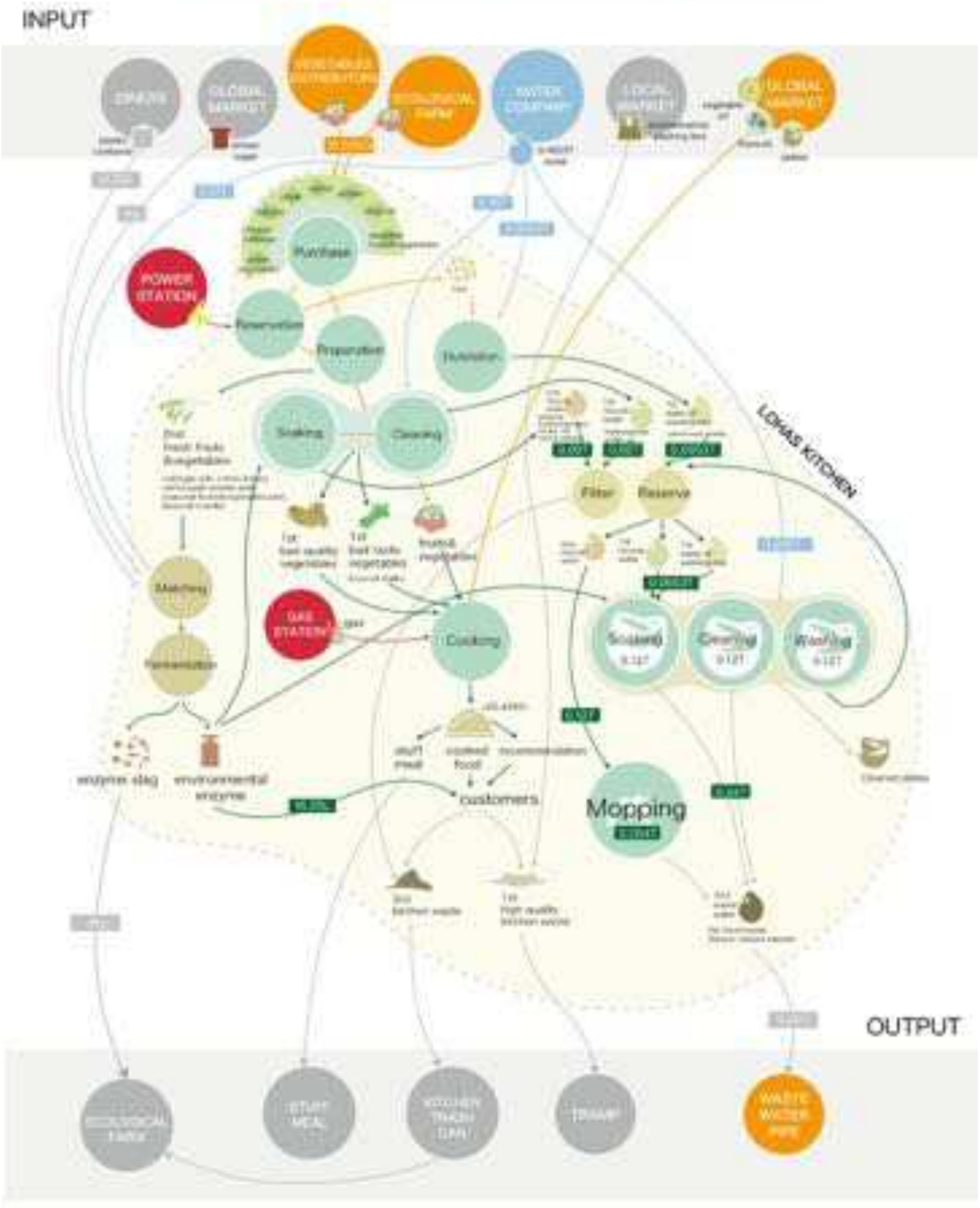
3. Systemic Design

– Vegetrian waste system:



3. Systemic Design

– Vagetarian Waste System:



3. Systemic Design

– Kitchen Waste economic analysis:

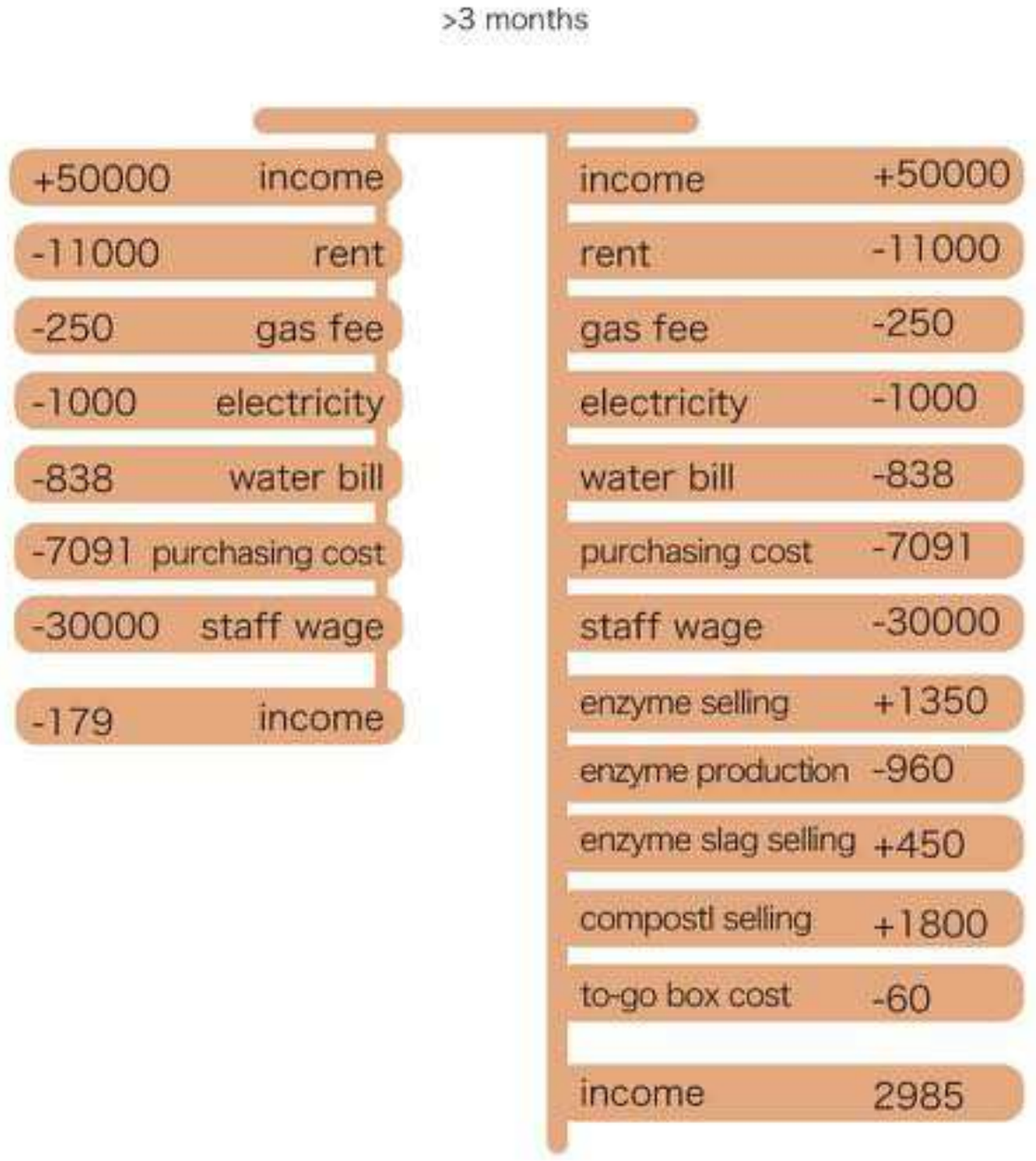
1st fresh fruit&vegetable	discount dishes		
2nd fresh fruit&vegetable	enzyme	make enzyme sale enzyme sale enzyme residue	−960/mon +1350/mon +450/mon
1st food waste	food for tramp	cost for package	−60/mon
3rd kitchen waste	compost	sale resources for compost	+1800/mon

3. Systemic Design

– LOHAS economic assessment:

3. Systemic Design

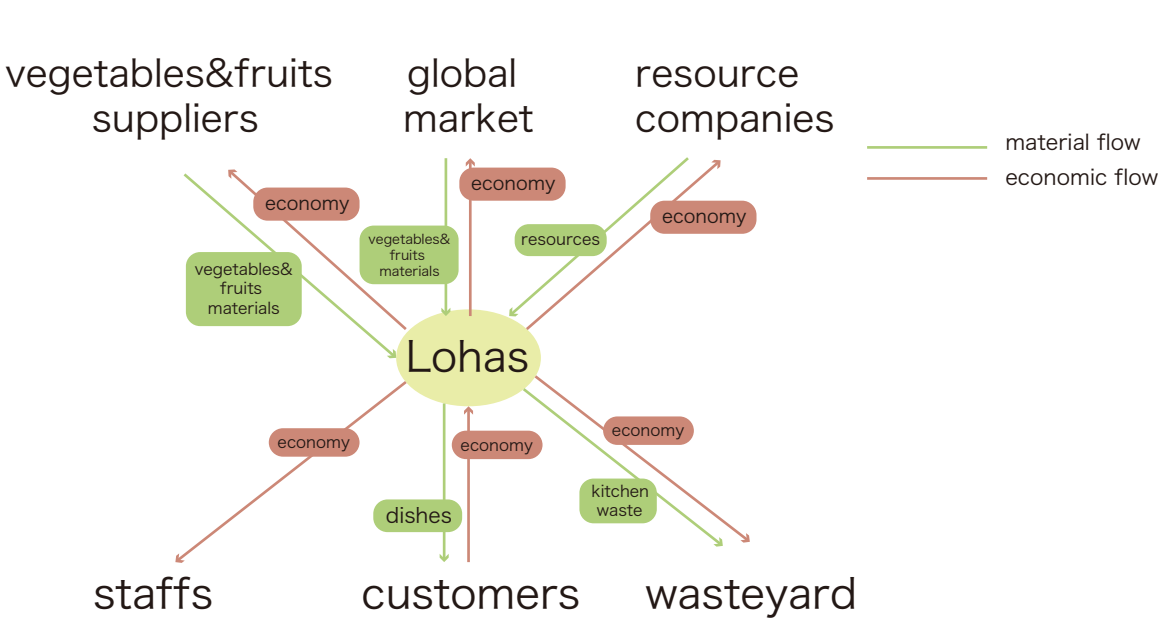
– LOHAS economic assessment:



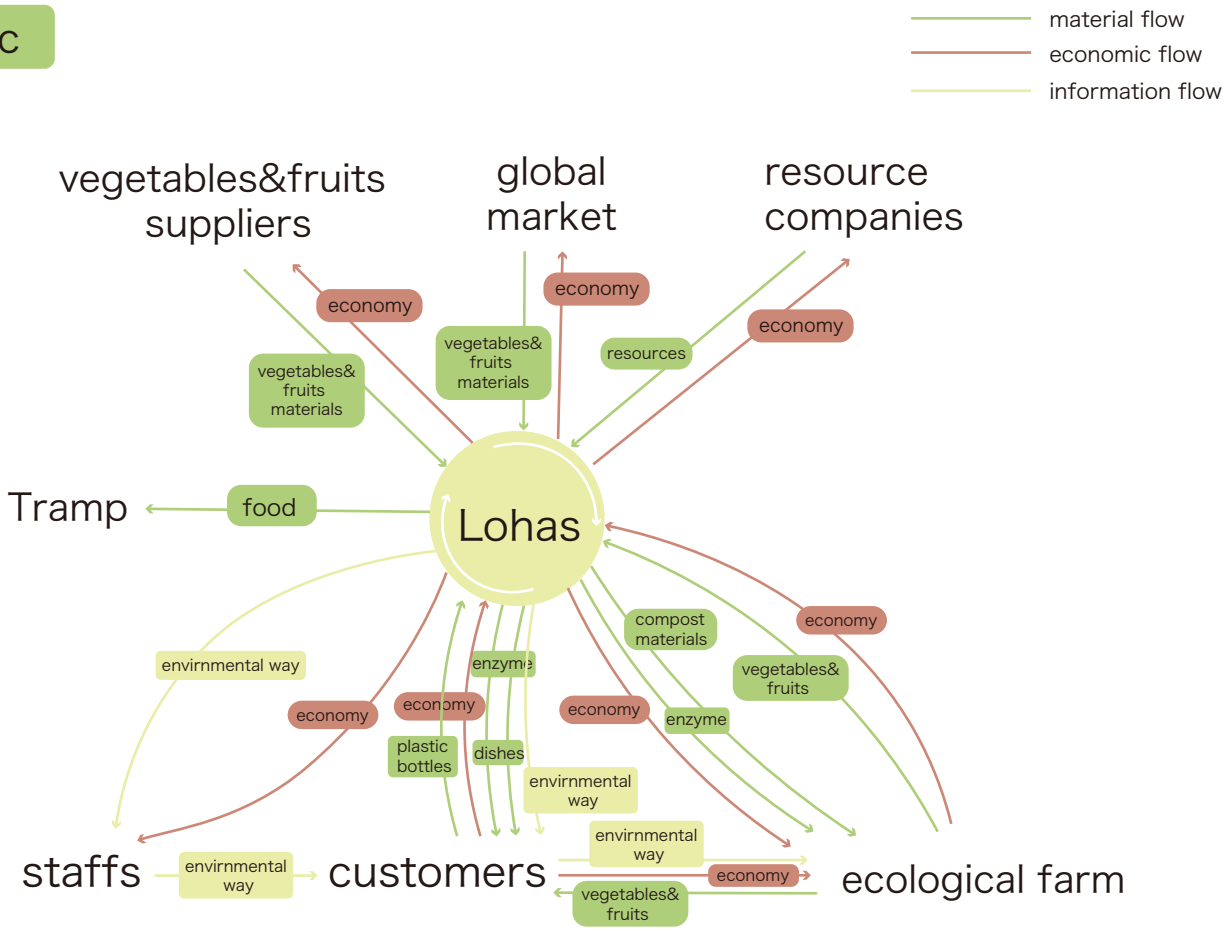
4. Service Design

– System map：

Linear

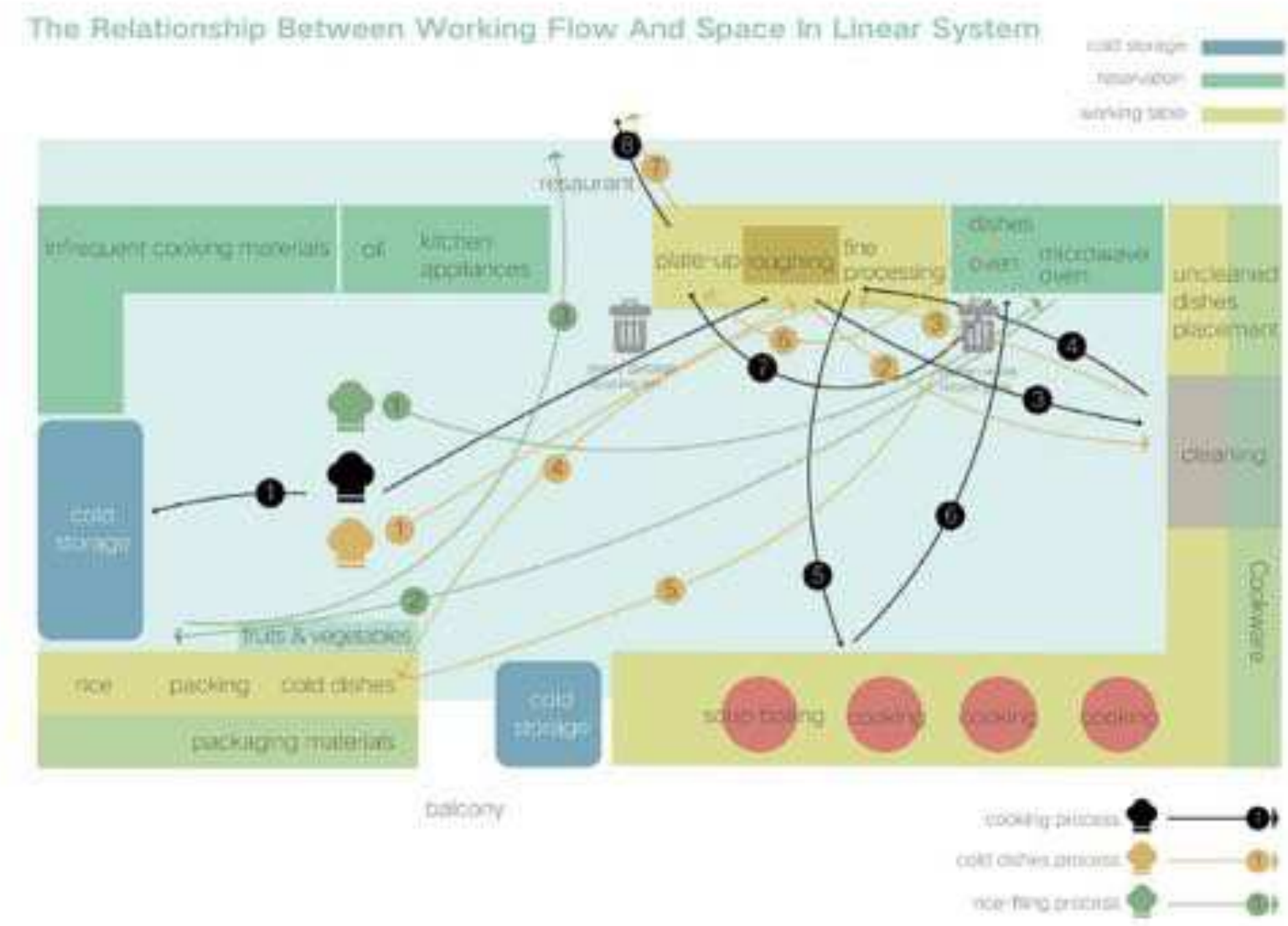


Systemic



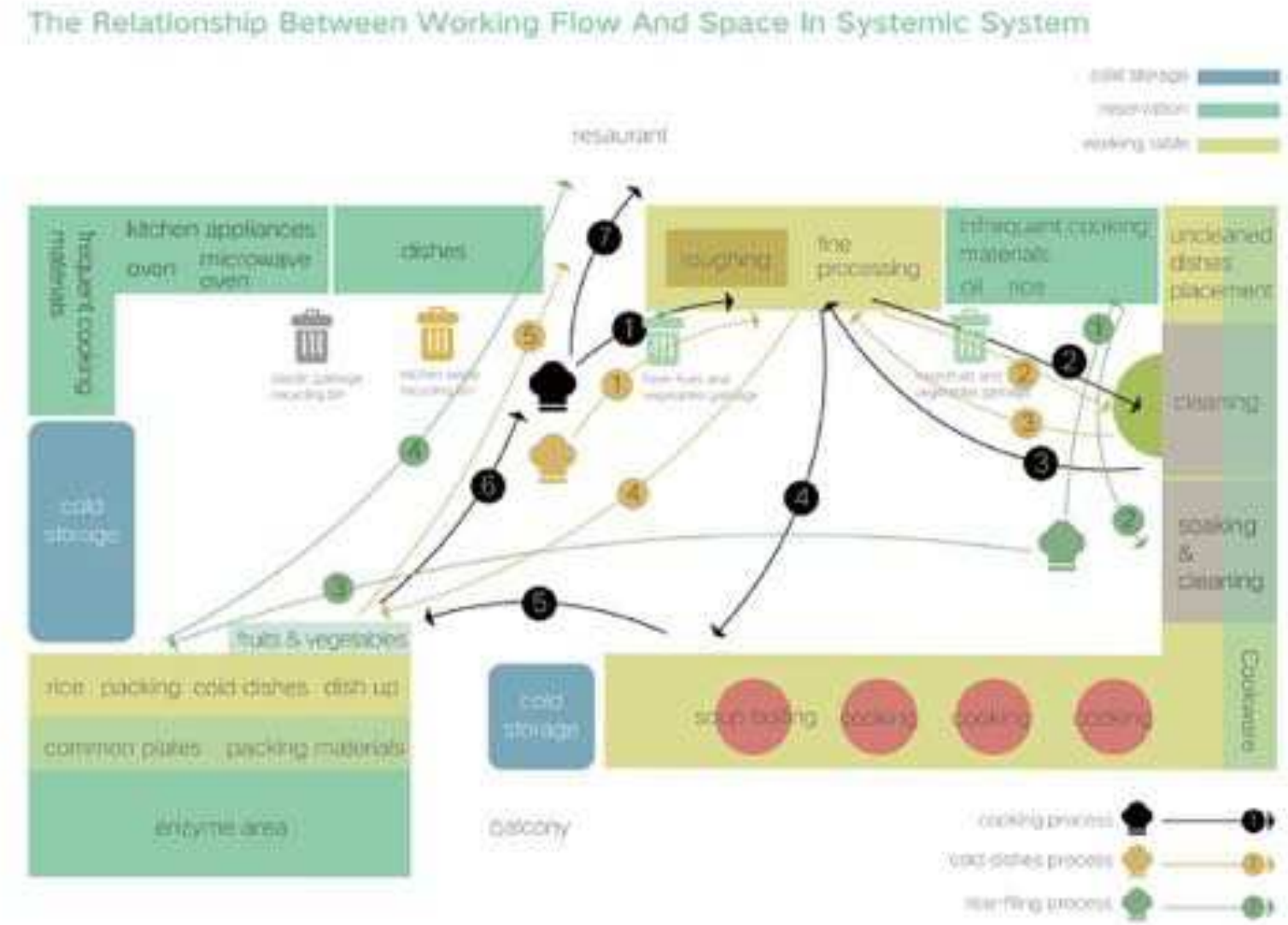
4. Service Design

– Linear working flow：



4. Service Design

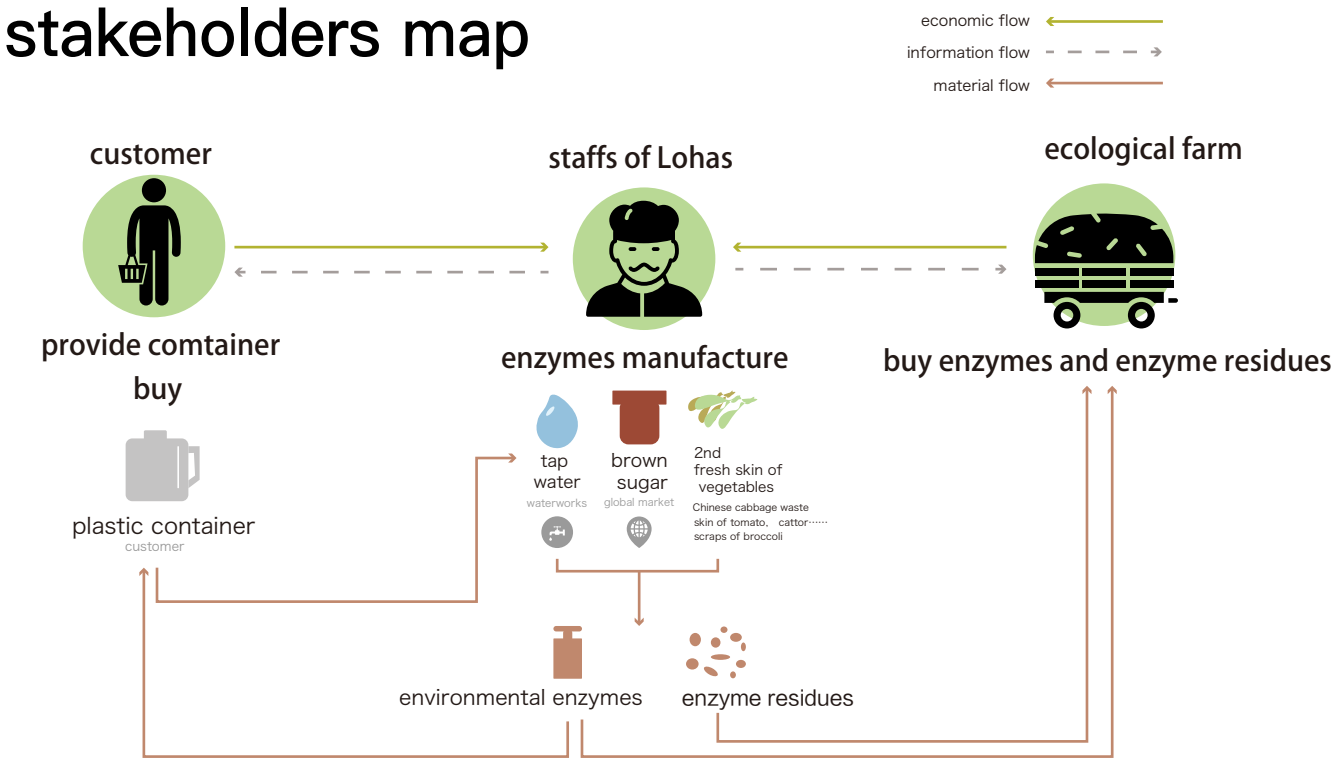
– Systemic working flow：



4. Service Design

– Enzyme related product design thinking:

For helping kitchen stuffs to making enzyme easily,we de– signed some tools to helping them checking enzyme states and rewards system to encourage customers involve in our system.

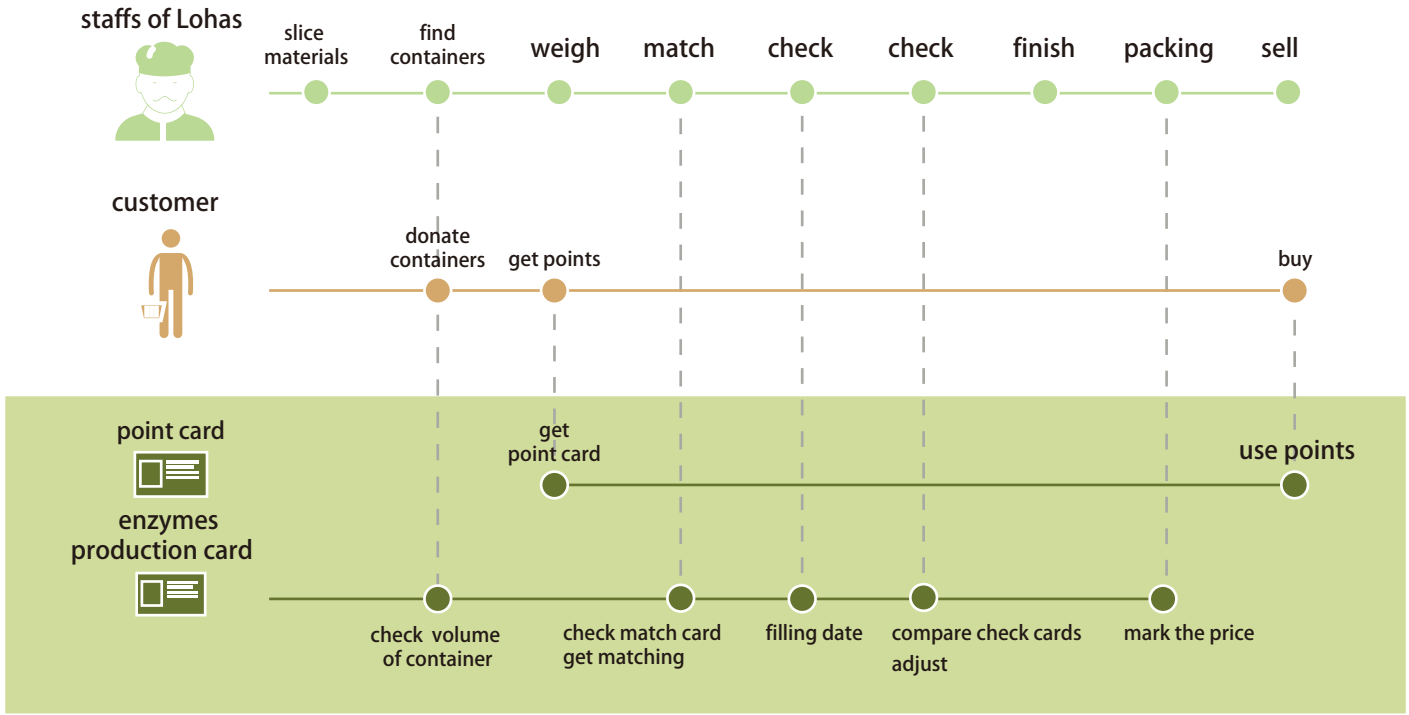


4. Service Design

– Enzyme related product design thinking:

The enzyme production cards to help staffs quickly learn enzyme production and examination of it. Point cards will record consumer donation and deduct a portion of consumption.

blue print



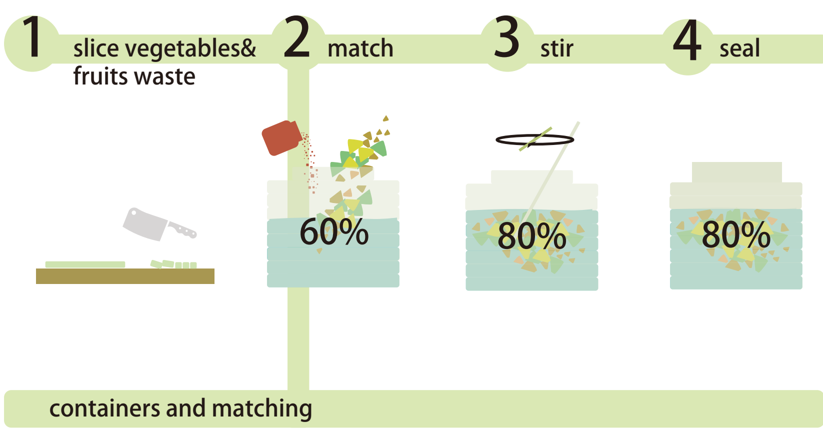
Systemic Design

4. Service Design

– Enzyme related product design —— the main card：

The main card for the enzyme production process guide and record the date. The relationship between the container and the ratio and the common ratio help the staff to complete the ratio.

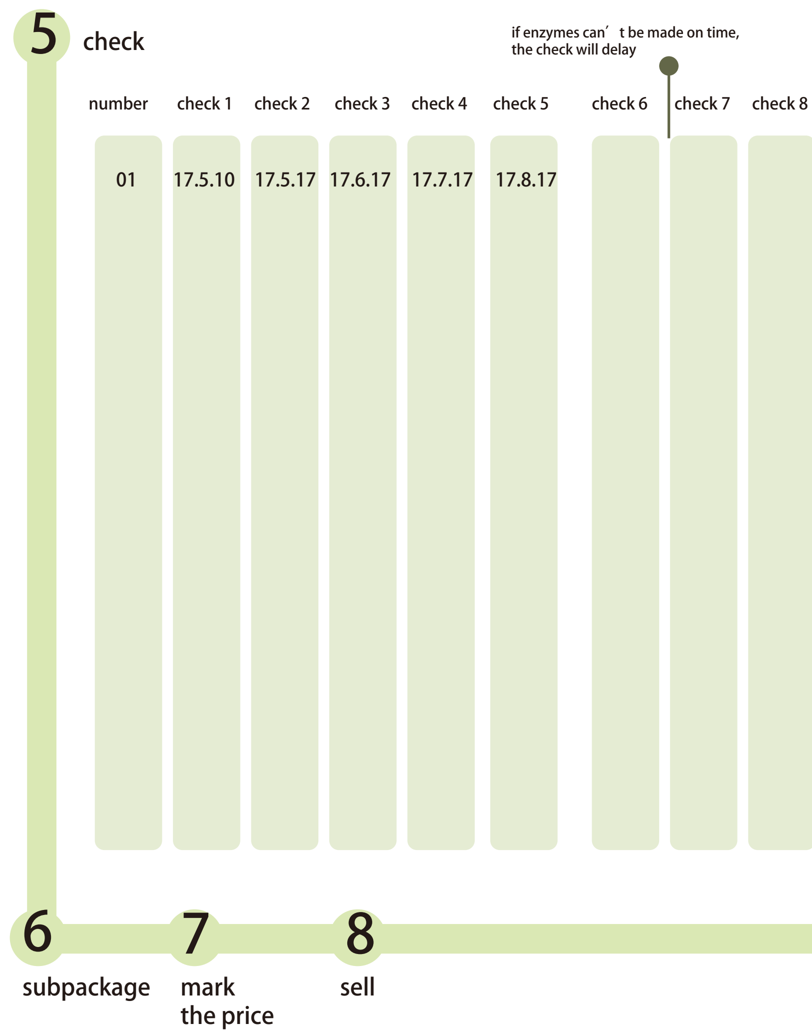
enzymes manufacture card - main card



x	0.6x	0.06x	0.18x
17L	10L	1KG	3KG
18L	10.8L	1.08KG	3.24KG
19L	11.4L	1.14KG	3.42KG
20L	12L	1.2KG	3.6KG
25L	15L	1.5KG	4.5KG

according this table to match

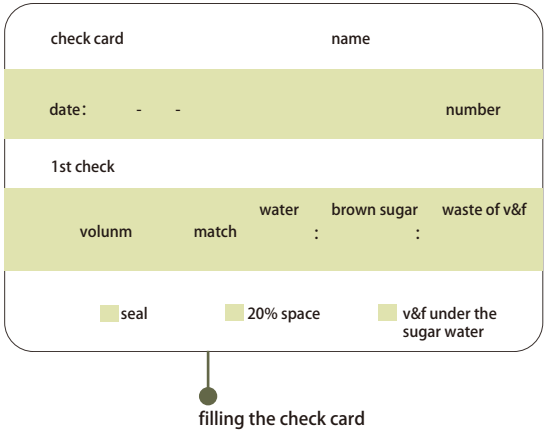
enzymes manufacture card - main card

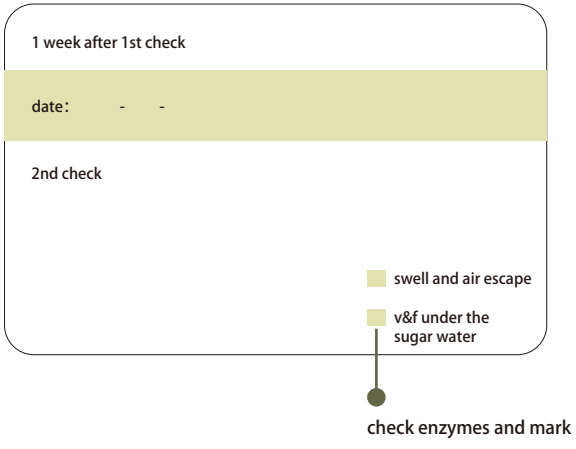


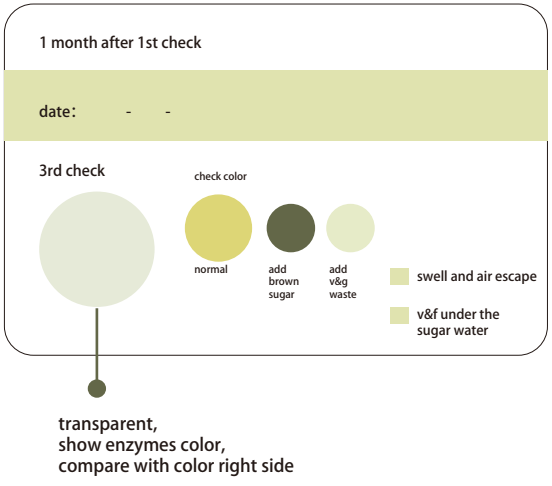
4. Service Design

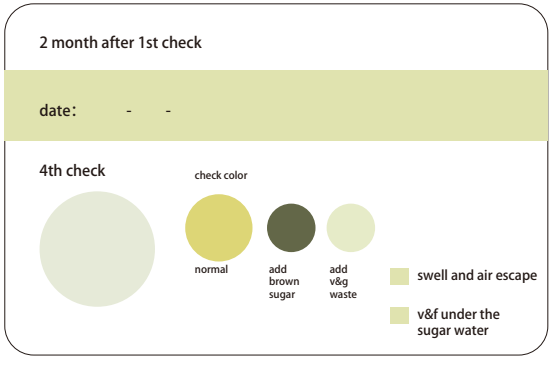
– Enzyme related product design —— the additional card：

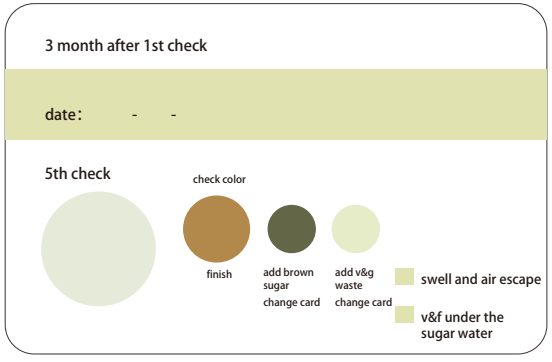
The additional card is used to compare and record 5 results of the check. They are connected to the straps and can be tied to the enzyme container bottle for easy inspection. When the first check card is used when complete the enzyme ratio, then the staff needs to fill in the details of the match–ing date, number, and ratio, and at the same time remind the staff to check the bottle body and enzyme status; The 2–5th cards are used to record the inspection results of different periods. The color cards on the 3–5th cards show the state of the enzymes by comparing with the color of the liquid in the bottles, reminding the staff to adjust them in time.







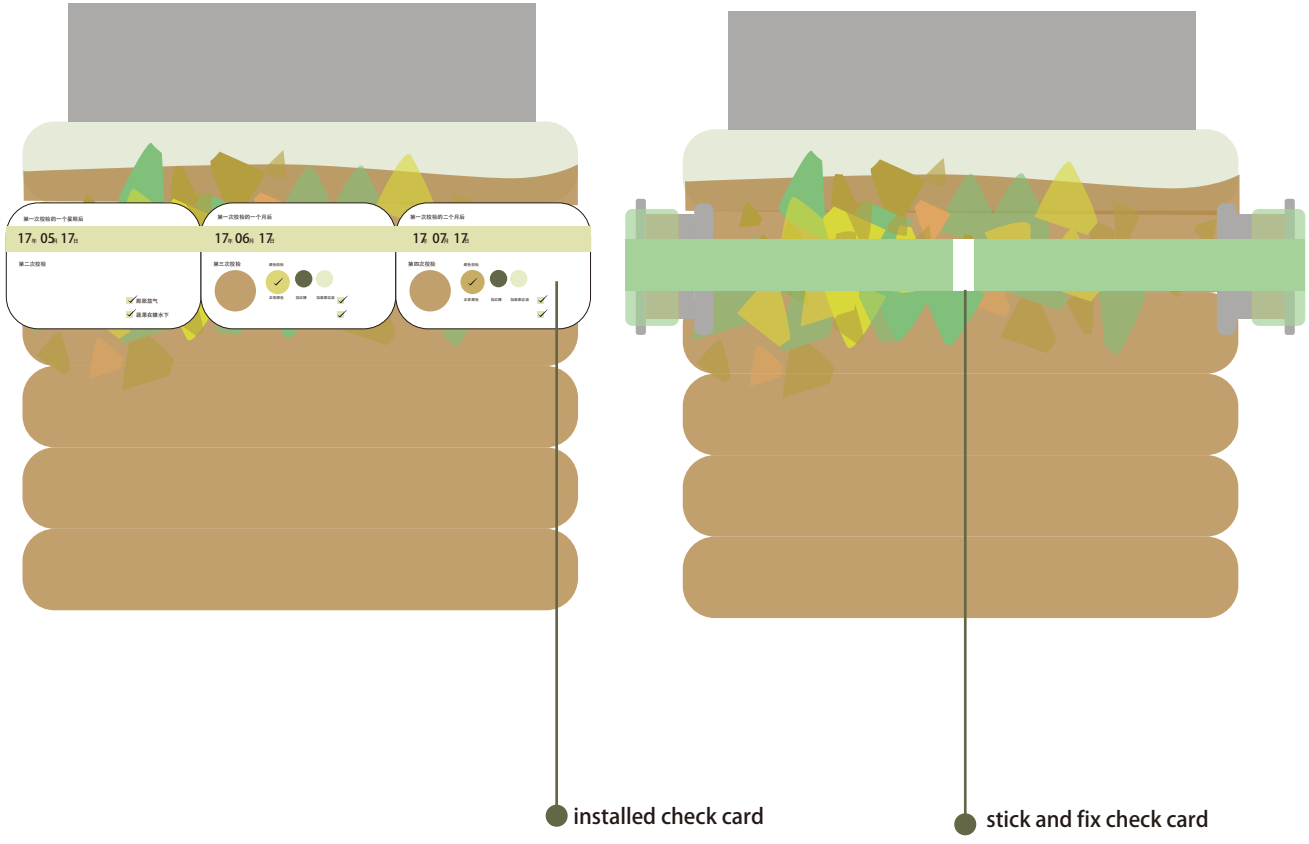




4. Service Design

– Enzyme related product design —— install check card：

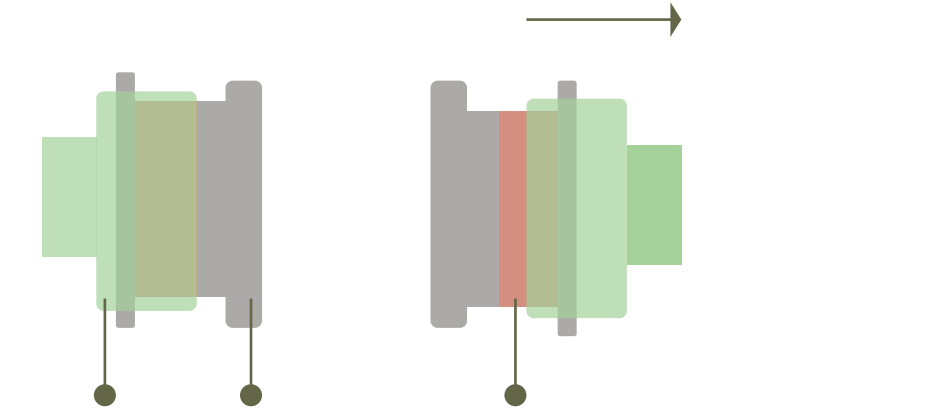
The straps of the cards are glued on the back and can be fixed on the enzyme bottle, which is convenient for timely inspection and recording.



4. Service Design

– Enzyme related product design —— swell reminder：

There are expansion warning structures on both sides of the straps. The expansion structure is composed of two paper snap structures. When the bottle body is in a normal state, the two structures are close together, and the middle red structure will not be exposed. If the bottle swells, it pulls one end of the strap to expose the red part of the clip. The longer the red part is exposed, the more inflated the bottle is, and the staff is reminded to release air in time to prevent accidents.



4. Service Design

– Enzyme related product design —— points card：

LOHAS uses points card to encourage consumers to participate in the circulatory system. According to the size of the bottle donated by the consumer, the score is integrated and marked. When the points reach 8, the consumer will enjoy a discount for any consumption in the store.

5. Summary and Outlook

– Summary

Proposes a complete vegetarian restaurant kitchen system model through systemic design methods.

Explores how the system actually works with service design methods and tools.

Based on the characteristics of the region of Shanghai, China. , It is a novel attempt to apply the systemic design.

The re-planning and application of kitchen waste of different quality not only changed the single profit model of the enterprise, but also changed the role of the consumer.

5. Summary and Outlook

– Outlook

Although the design is based on reality, there is no condition for the system model to be tested in practice. The optimization of the system requires dynamic tracking and constant adjustment

limited to our time and energy, we only chose the kitchen process and a related product in the system to do more in-depth design.

This study takes the winter kitchen system as the research object, and cannot fully examine and study the differences and problems that the system shows in the four seasons.